Ameren Exhibit 3.0RH

ILLINOIS COMMERCE COMMISSION

DOCKET No. 12-0244

DIRECT TESTIMONY ON REHEARING

OF

MICHAEL S. ABBA

Submitted on Behalf Of

AMEREN ILLINOIS COMPANY
d/b/a Ameren Illinois

JUNE 28, 2012

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Ameren Illinois

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Michael S. Abba. My business address is 1800 West Main Street, Marion, Illinois 62959.

Q. Are you the same Michael S. Abba who previously provided testimony in this proceeding?

A. Yes, I previously provided both direct and rebuttal testimony on behalf of Ameren Illinois Company d/b/a Ameren Illinois (AIC or Ameren Illinois) in this proceeding.

Q. Please describe your education and relevant work experience.

A. See my Statement of Qualifications, attached as an Appendix to this testimony.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your direct testimony on rehearing?

A. The purpose of my direct testimony on rehearing is to introduce evidence that supports a finding that AIC's Advanced Metering Infrastructure Plan (AMI Plan or Plan) is cost beneficial. In the May 29, 2012 order, the Illinois Commerce Commission (ICC or Commission) found the

AMI Plan had met all of the statutory requirements, except that the Plan was not cost beneficial. In this filing, Ameren Illinois will demonstrate the revised AMI Plan is cost beneficial, within the parameters of the law.

Q. Are you sponsoring any exhibits with your direct testimony?

A. Yes, I am sponsoring the following exhibits:

- Ameren Exhibit 3.1RH: Revised AMI Cost/Benefit Analysis
- Ameren Exhibit 3.2RH: Revised AMI Cost/Benefit Analysis - Blackline

III. COST/BENEFIT ANALYSIS REVIEW

Q. Please provide an overview of the revised AMI Cost / Benefit Analysis.

A. A detailed explanation of the costs, benefits, and net present value analysis of the revised AMI Plan is included in the revised Cost/Benefit Analysis, a clean version of which is included as Ameren Exhibit 3.1RH. Also included is Ameren Exhibit 3.2RH, which highlights the specific change to the Cost/Benefit Analysis compared to what was include in the AIC's original AMI Plan filing. The analysis is now based on the revised electric customer only deployment schedule of 62% in eight years. This analysis demonstrates that the present value of benefits exceeds the present value of costs by $406 million over the 20 year analysis period (2013-2032).

Q. What steps were taken by Ameren Illinois in revising the Cost/Benefit Analysis?

A. First, Ameren Illinois thoroughly reviewed the Commission's May 29, 2012 order and considered the Commission's findings in this filing. Second, we did a thorough review of all costs, benefits, and assumptions from the initial Cost/Benefit Analysis. Third, we identified areas where the Cost/Benefit Analysis needed to be revised in accordance with the

Commission's findings. Finally, we took into consideration costs and benefits in specific areas as appropriate, based on new information and/or further analysis.

Q. Did Ameren Illinois engage any external expert resources to assist with the AMI Cost/Benefit Analysis review and revision?

A. Yes. Ameren Illinois secured the services of three outside resources to assist with the AMI Cost/Benefit Analysis review and revision. Accenture assisted with the overall review of the analysis, conducted new detailed analysis in several areas, and assisted in the compilation of the revised AMI Cost/Benefit Analysis document. The Brattle Group reviewed the demand response benefit, and conducted a new detailed analysis of demand response, energy efficiency, electric vehicle, and carbon reduction benefits. Black and Veatch performed an overall review of the analysis and provided additional input.

Q. What specific material changes were made to the base case Cost/Benefit Analysis?

A. Assuming the 62% 10-year electric only scenario referred to in the Commission's order as a starting point, the following material changes were made to the base Cost/Benefit Analysis:

- Deployment Timeframe – The 62% customer electric meter deployment has been accelerated from 10 to eight years.
- Cost Data – The cost data was updated based on an initial review of the Meter Data Management System (MDMS), and AMI Network Request For Proposal (RFPs) responses.
- Manual Methods to Achieve Statutory Metrics – The costs and benefits of the incremental manual methods required to supplement AMI delivered benefits to meet three of the statutory metrics have been quantified and added to the analysis.
- Terminal Value Methodology and Calculation – From subsequent analysis, it was discovered that the terminal value methodology and calculation used in the original Cost / Benefit Analysis model produced an incorrect terminal value for the 62% 10-year electric only scenario. The terminal value methodology and calculation has been corrected.
- Incremental AMI related benefits from the Ameren Illinois Merger Integration and

Process Optimization study ("Merger Study") – These incremental Merger Study related benefits, including reduction in bill inquiries, reduction in back-office management, and asset management efficiency improvements, have been quantified and added to the analysis.

- Reliability Improvement Related Benefits – Incremental operations and customer benefits from improved reliability have been quantified and added to the analysis.
- Demand Response Benefits – Demand response benefits have been updated.
- Energy Efficiency Benefits – Energy efficiency benefits have been quantified and added to the analysis.
- Electric Vehicle Benefits – Benefits related to electric vehicle operation have been quantified and added to the analysis
- Carbon Reduction – Benefits from carbon reduction have been quantified and added to the analysis.

Q. Does the Energy Infrastructure and Modernization Act allow for inclusion of customer and societal benefits such as electric vehicle and carbon reduction benefits?

A. Yes. The definition of "Cost-Beneficial" clearly allows and supports the inclusion of such benefits, to quote " The total benefits shall include the sum of avoided electricity costs, including avoided utility operational costs, avoided consumer power, capacity, and energy costs, and avoided societal costs associated with the production and consumption of electricity, as well as other societal benefits, including greater integration of renewable and distributed power resources, reductions in the emissions of harmful pollutants and associated avoided health-related costs, other benefits associated with energy efficiency measures, demand-response activities, and the enabling of greater penetration of alternative fueled vehicles."

Q. Can you explain why the additional benefits listed above were not quantified in the original Cost/Benefit Analysis?

A. Frankly, we believed AIC had presented a sufficient case in the original filing to show that the AMI Plan was cost beneficial and so therefore it was not necessary to quantify these

benefits at that time. Many of these benefits were identified but not quantified in the original Cost/Benefit Analysis. Ameren Illinois chose not to quantify them since these additional benefits required a more detailed analysis and expertise that was not readily available at the time of the initial filing, and as I said, we believed we had sufficiently proven that the original AMI Plan as filed was cost beneficial.

Q. So why are you quantifying these benefits now?

A. For three reasons. First, the law specifically allows for inclusion of these benefits. Second, quantification of these AMI benefits is necessary in order to sufficiently prove a 62% electric only AMI deployment within 10 years is cost-beneficial. Third, some stakeholders (CUB/ELPC), as well as the Smart Grid Advisory Council, questioned why Ameren Illinois had not detailed and quantified some of these benefits further in our original AMI Plan and Cost/Benefit Analysis. For these reasons, we believe a more detailed analysis and quantification of these benefits provides for a more robust and thorough AMI Plan and Cost/Benefit Analysis.

Q. Did the deployment timeframe change and, if so, what was its effect on the Cost/Benefit Analysis?

A. Yes. Accelerating the installation of meters from a 10 year implementation to an eight year implementation also accelerates the realization of net customer value as well, since benefits are realized sooner and for a longer period of time during the analysis period. As shown in the sensitivity analysis section of the revised Cost / Benefit Analysis, it is estimated that this deployment acceleration yields an incremental $13 million of NPV over a 62% 10 year electric only scenario.

Q. Can you explain any changes in the overall estimated capital and O&M costs of the AMI deployment?

A. Yes. In early May, Ameren Illinois received responses from four vendors for the MDMS RFP. In early June, Ameren Illinois received responses from five vendors for the AMI Network RFP. With assistance from Accenture, Ameren Illinois performed an initial review of these RFP responses and adjusted the associated capital and O&M cost estimates in the Cost/Benefit Analysis accordingly. The more detailed information allowed Ameren Illinois to more appropriately identify and separate costs among major categories such as meters, meter installation, network installation, information technology, meter operations, and communications. On average, the overall costs were in-line with the cost estimates in the original Cost/Benefit Analysis. The total estimated 20-year capital costs of $272 million for the planned 62% electric only eight year deployment was virtually unchanged from the 62% 10-year electric only scenario referred to in the Commission's order. Total 20-year estimated O&M costs to maintain and operate the AMI network and support systems increased by approximately $4.5 million, partially due to the accelerated deployment.

A. Manual Method Adjustments

Q. Please explain the incremental manual methods required to supplement the AMI delivered benefits?

A. In response to the Commission's findings, Ameren Illinois has determined the type and amount of manual methods required to supplement the AMI delivered benefits in order to meet the three of the AMI related statutory metrics. Addressing the Estimated Bills metric, incremental on-cycle meter reading will be used to supplement the reduction in estimated bills

derived from AMI. It is estimated that these incremental manual on-cycle meter reads will begin in 2013, increase slightly in 2014, and then decrease each year until they are no longer needed in 2017. The estimated total cost of this manual method used in the analysis is $1 million.

Regarding the Consumption on Inactive Meter metric, incremental manual meter disconnects will be performed on targeted locked-hot meters with consumption. It is estimated that these incremental manual disconnects will begin in 2013, peak in 2017, drop in 2020, and then increase again through 2022. It is estimated that these incremental manual disconnects will need to continue throughout the 10-year metric period since the majority of Ameren Illinois consumption on inactive meter usage is occurring in the existing AMR areas. The estimated total cost of this manual method used in the analysis is $4 million.

Finally, with respect to the Uncollectibles metric, incremental manual disconnects for non-payment will be performed. Based on forecasted uncollectibles, and the yearly metric goals, it is estimated that these incremental manual disconnects for non-pay will only need to be performed in 2022. The estimated total cost of this manual method used in the analysis is $100,000.

Q. Is it forecasted that the Ameren Illinois AMI related metric yearly goals will be met by this revised AMI deployment plan, including the manual methods listed above?

A. Yes. The table below shows the yearly AMI related metric goals along with the forecasted results based on the revised AMI deployment plan including the manual methods.

Ameren Illinois AMI-Related Yearly Metric Performance Goals						
	Estimated Bills		Consumption on Inactive Meter		Uncollectible Expense	
	Goal (#)	Forecast	Goal (Kwh)	Forecast	Goal ($)	Forecast
2013	557,814	557,814	11,423,161	11,423,161	$17,423,333	$14,357,000
2014	524,724	524,724	10,745,516	10,745,516	$17,073,333	$14,715,925
2015	491,633	491,633	10,067,871	10,067,871	$16,723,333	$14,943,189
2016	458,542	458,542	9,390,225	9,390,225	$16,373,333	$14,459,868
2017	425,452	388,334	8,712,580	8,712,580	$16,023,333	$14,238,866
2018	392,361	263,899	8,034,935	8,034,935	$15,673,333	$13,994,798
2019	359,270	215,823	7,357,290	7,357,290	$15,323,333	$13,726,563
2020	326,180	214,329	6,679,645	6,679,645	$14,973,333	$13,748,019
2021	293,089	212,832	6,002,000	6,002,000	$14,623,333	$14,083,217
2022	259,998	211,332	5,324,355	5,324,355	$14,273,333	$14,273,333

Q. Assuming the Commission grants rehearing on the AMI Plan, will the timing of the anticipated order have any bearing on the metrics plan approved by the Commission in Docket No. 12-0089 on May 29, 2012 and the yearly metric goals approved within this order?

A. Yes it does. Approval of the AMI Plan at a later time than anticipated could affect the start of the AMI related metrics clock. At a high level, this means Ameren Illinois in theory could shift the 10-year AMI related metrics plan starting year by approximately one year from 2013 to 2014.

B. Terminal Value Methodology and Calculation Change

Q. Can you explain the change in the terminal value methodology and calculation?

A. The details of the change in the terminal value methodology and calculation are discussed

in the testimony of AIC witness Mr. James Mazurek. The NPV of the terminal value of the 62% electric only eight year deployment is estimated to be $119 million.

C. Benefit Changes/Additions

Q. Can you explain the additional benefits related to Ameren Illinois' Merger Study?

A. The details of the additional benefits related to the Merger Study are discussed in the testimony of Mr. Mazurek. In summary, the total nominal value of these benefits is $14 million.

Q. Are there any estimated incremental capital or O&M costs associated with the realization of the Merger Study benefits?

A. Yes, as also explained in more detail in Mr. Mazurek's testimony, to achieve the incremental Merger Study benefits, an additional $500,000 per year in customer education costs for the first five years of deployment was assumed. In addition, a one-time $1,000,000 capital expenditure in enhanced system planning tools, along with an annual system maintenance cost of $100,000 per year was assumed. These costs have been added to the Cost/Benefit Analysis.

Q. Can you explain the additional reliability improvement related benefits and their net nominal value?

A. The details of the additional reliability improvement related benefits are discussed in the testimony of Mr. Mazurek. The total nominal value of these additional reliability improvement related benefits is estimated to be $60 million.

Q. Are there any estimated incremental capital or O&M costs associated with the realization of the reliability improvement benefits?

A. No. The cost of functionality necessary to achieve the reliability improvement benefits is

already included in the Cost/Benefit Analysis.

Q. Can you explain the changes to the demand response benefit and its nominal net value?

A. The details of the changes to the demand response benefit are discussed in the testimony of Dr. Ahmad Faruqui. From Dr. Faruqui's analysis, the net nominal value of the demand response benefit is estimated to be $403 million, based on estimated benefits of $406 million and an incremental cost to realize the benefits of $3 million. This incremental cost does not include the additional customer education and technology support costs I discuss in more detail below.

Q. Can you explain the addition of a quantified energy efficiency benefit and its nominal net value?

A. The details of the energy efficiency benefit are discussed in the testimony of Dr. Faruqui. From Dr. Faruqui's analysis, the net nominal value of the energy efficiency benefit is estimated to be $22 million, based on estimated benefits of $24 million and an incremental cost to realize the benefits of $2 million. This incremental cost does not include the additional customer education and technology support costs I discuss in more detail below.

Q. Can you explain the addition of a quantified electric vehicle benefit and its nominal net value?

A. The details of the electric vehicle benefit are discussed in the testimony of Dr. Faruqui. From Dr. Faruqui's analysis, the net nominal value of the electric vehicle benefit is estimated to be $138 million, based on estimated benefits of $151 million and an incremental cost to realize benefits of $13 million. This incremental cost does not include the additional customer education

and technology support costs I discuss in more detail below.

Q. Can you explain the addition of a quantified carbon reduction benefit and its nominal net value?

A. The details of the carbon reduction benefit are discussed in the testimony of Dr. Faruqui. The nominal value of the carbon reduction benefit is estimated to be $11 M. The carbon reduction benefits are linked directly to the energy efficiency and electric vehicle benefits above, so therefore there are no incremental costs to realize the carbon reduction benefits.

Q. Are there any additional incremental costs related to the demand response, energy efficiency, electric vehicle, and carbon reduction benefits that are not mentioned in Dr. Faruqui's testimony?

A. Yes. In order to ensure appropriate support and interface with the enabling customer technology necessary to realize the demand reduction, energy efficiency, electric vehicle, and carbon reduction benefits, an additional $23 million was added to the cost/benefit analysis. These estimated dollars could be spent by the Ameren Illinois, a third party provider, or directly by the customer, depending on who is providing the enabling technology and associated services.

Q. It also appears that the Cost/Benefit Analysis contains additional customer education dollars. Can you explain?

A. Yes. In addition to the $2.5 million in increased customer education spend to support the incremental Merger Study benefits mentioned above, we also added approximately $4.8 million in additional customer education related to dynamic pricing programs and associated technology. We also further segmented the customer education dollars into two categories: (1) deployment

and initial functionality; and (2) dynamic pricing & technology. This segmentation illustrates the on-going need for continued customer education around dynamic pricing programs, technology, and the benefits of AMI well after the initial AMI deployment and customer acceptance period is over.

Q. Were there any other material changes made to the Cost / Benefit Analysis outside the base case changes?

A. Yes. Ameren Illinois also changed the methodology for three sensitivity analysis:

- 100% 15-year electric only
- 62% 10-year electric only
- Disconnects for Non-Pay – Add Premise Visit Costs

Q. Can you explain the 100% 15 year electric only sensitivity analysis?

A. Yes. This sensitivity analysis adjusts the base case by assuming that AMI electric meter deployment resumes in year 11 (2022) and proceeds until 100% of Ameren Illinois customers are served by an AMI meter by the end of 2026. This sensitivity analysis produces an incremental NPV of $305 million over the base case and remains cost beneficial with a total NPV of $711 million.

Q. Can you explain the 62% 10-year electric only sensitivity analysis?

A. Yes. This sensitivity analysis assumes that the 62% electric only deployment occurs at a slower pace, reaching 62% deployment in 10 years rather than the eight years in the base case. This sensitivity analysis reduces the NPV by $13 million from the base case, but still remains cost beneficial with an NPV of $393 million.

Q. Can you explain the changes to the disconnects for non-pay sensitivity analysis?

A. Yes. Like the initial Cost/Benefit Analysis, this revised Cost/Benefit Analysis assumes that the full functionality of the AMI technology, in this case the remote switch capability, will be used to execute disconnects for non-pay. The disconnects for non-pay sensitivity analysis addresses the concern of some stakeholders that a premise visit or "knock at the door" is a societal benefit and is still required under existing regulation, and therefore must still occur even if remote switch functionality is being used. In the original Cost/Benefit Analysis, this sensitivity was calculated based on the very simple assumption that if a premise visit was still required none of the benefits of remote disconnect for non-pay could be realized, meaning that all disconnects would still be worked manually by the existing workforce, no increase in the number of disconnects would occur, and therefore no reduction in uncollectible expenses would occur.

The revised disconnect for non-pay sensitivity analysis takes a more rigorous approach, and continues to assume that the full functionality of the remote switch for disconnects for non-pay can be utilized. Therefore, all the operational cost reduction from eliminating manual disconnects for non-pay can be realized, as well as the benefit from reduced uncollectible expenses can be realized. To comply with the premise visit/"door knock" requirement, the sensitivity analysis assumes a separate, appropriately skilled, trained, and equipped workforce is used to complete the premise visit immediately prior to the remote disconnection. With this revised approach, the revised sensitivity analysis reduces the base case NPV by $10 million, and still remains cost beneficial with an NPV of $396 million.

Q. Were there any other material changes made to the cost/ model, its methodology, or its calculations?

A. No. Other than the material changes noted above, the model methodology remained

unchanged from the originally filed version. No party, including the Commission, found fault with the model methodology, nor the calculations within the model.

IV. CONCLUSION

Q. Does this conclude your direct testimony on rehearing?

A. Yes, it does.

APPENDIX
STATEMENT OF QUALIFICATIONS
MICHAEL S. ABBA

Employment

- **Ameren / Ameren Illinois Company** (January 1996 – Present)
  - **Manager – Smart Grid Integration & System Improvement** (January 2012 – Present)
    Responsible for identifying and coordinating the implementation of smart grid and other system improvement projects within Ameren Illinois Company (AIC) in accordance with applicable Illinois law and regulations.
  - **Project Manager – Smart Grid** (February 2009 – December 2011)
    Project Manager for all smart grid related activities at the Ameren Illinois Utilities (AIUs). Responsibilities include developing AIUs' smart grid related strategies, policies, and procedures, management of AIUs' participation in the Illinois Statewide Smart Grid Collaborative, supporting engineering and field operations personnel with smart grid related activities, responding to public smart grid related inquiries, and coordinating AIUs' smart grid stimulus applications.
  - **General Supervisor – Administration and Business Services** (April 2004 – February 2009)
    Responsibility for all human resource, staffing and procedure, and systems development and support for Ameren Illinois Division VII and later Division VI. Also supervision of up to 9 clerical employees in up to 5 offices. Handled special projects and initiative implementation including WPS, EMPRV, ILJUNS, and ACO system implementation. Field checked, engineered, and supervised electric crews during storm recovery.
  - **Region Coordinating Supervisor** (October 1998 – April 2004)
    Responsible for human resource, staffing, procedure, and systems development and support for the Shawnee Division, as well as supervision of clerical staff. Also served on numerous Ameren-wide initiative teams including team leader for CSS Phase 1 implementation for AmerenCIPS, and AmerenCIPS representative for CSS Phase 2 implementation for all of Ameren.
  - **Business Improvement Consultant** (February 1996 – October 1998)
    One of four Business Process Re-Engineering Team members retained to further implement new field operations organizational structure and new Ameren systems and procedures. Reported directly to a Vice President. Traveled extensively throughout AmerenCIPS implementing new organization, designing and implementing new procedures, and adjusting Ameren systems to fit the needs of AmerenCIPS.
- **Central Illinois Public Service Company** (July 1990 – December 1995)
  - **Business Process Re-Engineering Team** (February 1995 – February 1996) Was part of a cross functional team studying CIPS field operations organizational structure and procedures to streamline operations, improve customer service, and improve efficiency. The team developed and began implementation of an entirely new

organization structure, new positions, and new set of procedures.

- **Electric Field Worker** (June 1993 – January 1994)
  Performed electric line work from June 1993 – January 1994 due to union lockout and subsequent work actions. Directly set and climbed poles, strung wire, hung transformers, investigated outages, repaired wire, operating bucket and line trucks, trenched underground wire, set underground transformers and completed terminations, located underground wire, changed meters, and performed other electric operations and outage recovery duties.
- **Industrial Services Engineer** (March 1991 – February 1995) Responsible for the business relationship with large industrial, institutional, and commercial electric and gas customers. Handled all gas and electric new business, expansion, and rate inquiries from these customers. Investigated customer Power Quality and EMF inquiries.
- **Distribution Engineer** (July 1990 – March 1991)
  Field checked electric distribution systems, completed voltage studies, made recommendations for system changes and voltage conversions, designed conversion projects, and ensured work was completed as designed. Also designed and reviewed new business expansions.

Education

- Masters of Business Administration – Southern Illinois University at Edwardsville – August 1994.
- Masters of Science in Electrical Engineering – Southern Illinois University at Carbondale – August 1990.
- Bachelor of Science in Electrical Engineering – Southern Illinois University at Carbondale – May 1989.

Professional Memberships

- IEEE – Senior Member
- National Society of Professional Engineers. Past President of Egyptian Chapter of Illinois Society of Professional Engineers.
- Board Member – SIU-C EE Industrial Advisory Council
- Board Member – SIU-C EET Industrial Advisory Council

Other Proficiencies

- Licensed Professional Engineer – State of Illinois
- Ameren Management Development Forum – October 2007 - May 2008
- SafeStart Trainer – March 2008
- 7 Habits of Highly Effective People – March 2007
- MARC Labor Relations Training – October 2000

Advanced Metering Infrastructure (AMI)

Cost / Benefit Analysis

June 2012

Table of Contents

1. Executive Summary

This document expands on the AMI Plan for Ameren Illinois Corporation (Ameren Illinois) to implement cost-beneficial advanced metering infrastructure (AMI). These pages describe how Ameren Illinois evaluated and prioritized technologies to create value for our customers, our company, and the State of Illinois via AMI.

To develop the cost/benefit analysis for the AMI deployment, Ameren Illinois used the guiding principles outlined in Section 16-108.6(a) of the Illinois Public Utilities Act which provides as follows:

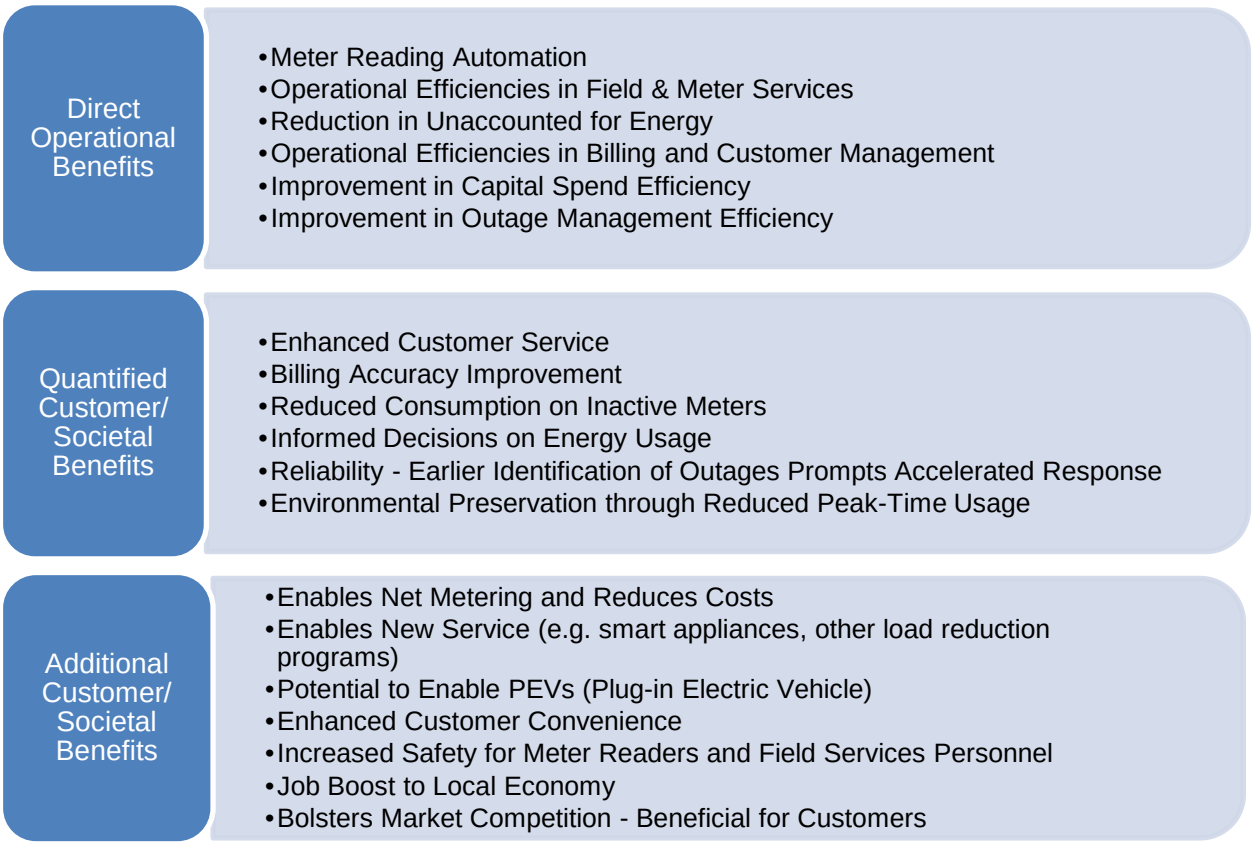
> "Cost beneficial" means a determination that the benefits of a participating utility's Smart Grid AMI Deployment Plan exceed the costs of the Smart Grid AMI Deployment plan as initially filed with the Commission or as subsequently modified by the modified by the Commission. This standard is met if the present value of the total benefits of the Smart Grid AMI Deployment Plan exceeds the present value of the total costs of the Smart Grid AMI Deployment Plan. The total cost shall include all utility costs reasonably associated with the Smart Grid AMI Deployment Plan. The total benefits shall include the sum of avoided electricity costs, including avoided utility operational costs, avoided consumer power, capacity, and energy costs, and avoided societal costs associated with the production and consumption of electricity, as well as other societal benefits, including the greater integration of renewable and distributed power sources, reductions in the emissions of harmful pollutants and associated avoided health-related costs, other benefits associated with energy efficiency measures, demand-response activities, and the enabling of greater penetration of alternative fuel vehicles."

As support for the AMI Plan, Ameren Illinois developed a cost/benefit analysis of implementing AMI within the Ameren Illinois service territory and submitted this filing to the Illinois Commerce Commission (ICC) on March 30, 2012. In conducting this evaluation, the project team worked closely with business managers over an 8-month period (August 2011 – March 2012) to refine the scope of the AMI investment, research industry AMI initiatives, develop operational data and projections, identify and resolve key business case formation questions, and construct the AMI business case.

During June 2012, after the ruling of the ICC on the initial filing, Ameren Illinois fine-tuned the cost/benefit analysis, refocusing the base case to an 8 year, 62%, electric-only AMI meter deployment plan, adding additional benefits in key areas, and refining cost estimates.

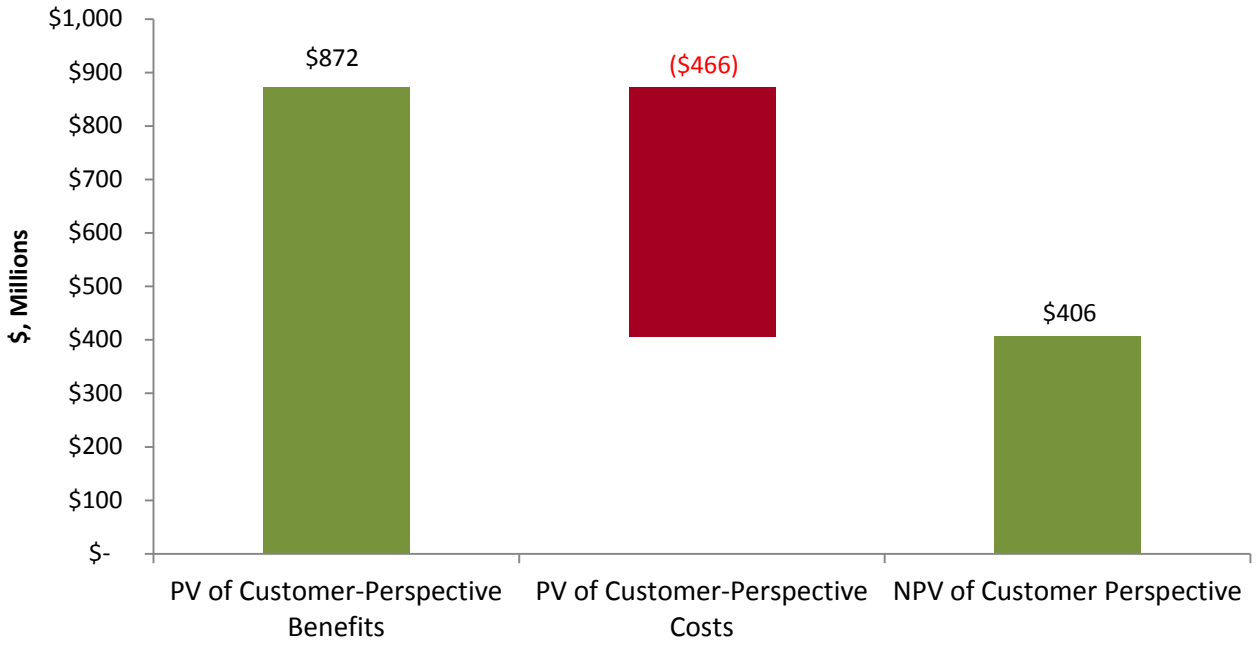
Figure 1 summarizes the specific benefits of this implementation.

Figure 1: AMI Implementation Benefits Summary



The overall results of the evaluation are positive. Taking into account all costs and benefits, and assuming adjustments to customer rates, the Net Present Value (NPV) is $406 million over the 20-year cost/benefit evaluation term (including terminal value) as seen in Figure 2. This is the value of the AMI program to Ameren Illinois customers. This does not include the Additional Customer/Societal benefits of AMI outlined subsequently in this evaluation.

Figure 2: NPV of Ameren Illinois AMI Business Case Summary



On the cost side, Ameren Illinois will incur new costs for AMI meters and communications infrastructure, IT systems, implementation services, and on-going operational expenses. During the 20-year evaluation period, Ameren Illinois expects the Present Value total cost of ownership to reach $466 million.

The Present Value of benefits over the 20-year evaluation period is estimated at $872 million, and exceeds the Present Value of costs by $406 million. Benefits result from meter reading automation, reduction in unaccounted for energy, operational efficiencies in field & meter services, billing and customer management, improved distribution system spend efficiency, as well as customer benefits such as reduction in consumption on inactive meters and Demand Response benefits and the others listed in Figure 1.

2. Ameren Illinois AMI Context and Background

As a utility serving the State of Illinois, Ameren Illinois is a leading energy provider that serves more than 1,200 communities. Every day, Ameren Illinois delivers energy to 1.2 million electric and 840,000 natural gas customers in central and southern Illinois. Ameren Illinois is also an early adopter of Automated Meter Reading (AMR), having introduced this technology to parts of the utility's 43,700-mile service territory in 1998. Upon completion of the automated meter deployment in 2010, Ameren Illinois had installed 678,000 electric and 476,000 gas one-way-communication-enabled AMR meters covering more than half of its gas and electric customers.

Taking advantage of advancements in metering technology and leveraging two-way radio frequency (RF) networks, Ameren Illinois strives to promote "green" technologies and ensure high-quality service in a cost-effective manner through the AMI initiative. As such, and in order to fulfill the provisions required as part of the AMI Plan, our AMI cost/benefit analysis evaluates a 20-year investment and outlines the determination that the benefits exceed all costs reasonably associated with this initiative.

A number of key assumptions were formed as Ameren Illinois analyzed variables and scenarios to identify impacts to customers from implementing AMI in its service territory. Additional detailed assumptions are contained in the Appendix.

2.1. Key Deployment Assumptions

2.1.1. Ownership/Operation of AMI Network

Ameren Illinois plans to own and operate the AMI communications network (as opposed to paying an outside vendor to own and/or operate the network).

2.1.2. Standalone Electric Base Case

For the purposes of this business case, it is assumed that AMI is implemented for electric customers only, and all costs associated with the electric AMI rollout are included. Ameren Illinois understands that there will be costs and benefits to customers from implementing AMI within its gas service territory in conjunction with AMI electric.

2.1.3. Implementation Schedule

The timing of meter deployment drives different costs and benefits for Ameren Illinois customers. As per the statutory requirement, Ameren Illinois is committed to serving 62% of its electric customers with AMI within 8 years. To meet the 62% requirement, Ameren Illinois has chosen an 8 year deployment plan that ends in 2019. Deployment will start in and include all of the non-AMR operating centers which will include 46% of the 62% requirement. The remaining 16% will be in the AMR operating centers by 2019.

2.1.4. Vendor Pricing

Ameren Illinois issued Requests for Information (RFI) and Requests for Proposal (RFP) to a base of AMI and Meter Data Management (MDM) vendors. The RFP responses included detailed pricing on the AMI Network deployment and MDM implementation. Since specific vendors have not been selected at this time, this cost/benefit analysis uses an average pricing methodology from the responses to the RFP.

2.1.5. Business Case Approach

During the period from August 2011 through June 2012, the Ameren Illinois AMI project team has worked closely with:

- Ameren Illinois business executives to understand the strategic imperatives and refine the scope of the AMI investment
- Ameren Illinois function leaders to project operational activities and associated costs and benefits
- External vendors and industry experts to obtain metering, communication and IT infrastructure cost estimates, research industry AMI initiatives, identify and resolve key business case formation questions, and construct the AMI business case

2.1.6. Cost Estimates Approach

The Ameren Illinois AMI project team worked through formal RFI and RFP processes to engage with multiple external vendors to obtain cost estimates for AMI field hardware (meters and communications infrastructure), installation, software purchase, and administration costs. The team also engaged with both external IT vendors and internal IT and Corporate Planning teams to assess the costs associated with hardware procurement, software purchasing and licensing, IT development and integration, and overall support and maintenance of the IT systems and infrastructure needed during AMI deployment. Moreover, department leaders helped identify resource requirements and cost estimates for program management and associated operational activities such as customer education, customer management, and technical support.

With respect to meter depreciation, Ameren Illinois has reviewed some of the largest AMI deployment plans in the United States, such as those by Duke Energy, Southern California Edison, DTE, and PG&E to base its AMI deployment on a useful life of 20 years for the AMI meter. As with any complex system, individual components may fail early or last longer than the overall useful life. The AMI meter's useful life does not depend on when the first component fails or how long the last meter-module functions. Instead, its life depends on the system as a whole operating correctly and reliably**.** Moreover, Southern California Edison conducted product testing that concluded that the meter useful life would be 20 years or more[1].

2.1.7. Benefit Estimates Approach

The Ameren Illinois AMI project team relied heavily on both internal and external AMI and metering experts to identify AMI benefit areas and detail cost reductions and loss prevention associated with each benefit area commensurate with the meter deployment schedule. While direct operational and customer benefits in several areas such as meter reading, field and meter services, unaccounted for energy, billing accuracy, consumption on inactive meters, Demand Response, Energy Efficiency, and PEV were quantified, numerous additional customer and societal benefits have also been evaluated and included in the business case.

2.1.8. Cost/Benefit Analysis Approach

A rigorous approach to the AMI cost / benefit analysis was conducted by using several different evaluation methodologies, including Payback Period, Net Present Value (NPV) analysis, as well as Total Resource Cost (TRC) analysis. The time horizon used for the business case was 20 years. However, a terminal value was also calculated to take into account the costs and benefits associated with the un-depreciated AMI infrastructure remaining beyond the 20 year period. The cost benefit analysis is taken from the customer perspective, with costs and benefits modeled as revenue requirement adjustments.

[1] SCE Cost Benefit Analysis, Vol 3., December 21, 2006

As such, the discount rate that is used for the NPV analysis should also reflect a customer-perspective discount rate. This is consistent with the Illinois Statewide Smart Grid Collaborative (ISSGC) recommendation of "using an appropriate discount rate." Therefore, a customer-relevant discount rate was used for this analysis as the 20-Year Treasury Bill rate (3.62% currently). This approach is consistent with the ComEd AMI pilot evaluation and the Ameren Illinois Cost/Benefit Analysis timeframe.

2.2. Alignment with Illinois Statewide Smart Grid Collaborative Recommendations

Ameren Illinois adhered to the guidelines of the Illinois Statewide Smart Grid Collaborative (ISSGC) when developing the cost and benefit estimates. The table below summarizes how Ameren Illinois complied with these guidelines.

Table 1: Alignment with ISSGC Cost-Benefit Filing Requirements

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
1. Provide cost-benefit analyses of the investment(s), including a Total Resource Cost test:	The analysis should include any factor (i.e., cost or benefit) that meets the following criteria: • They can be expected to have a meaningful economic impact on the utility's investment decision or are relevant to the Commission's approval decisions • They can be reasonably and transparently quantified and monetized • They are relevant to the analysis, specifically including the costs of achieving claimed benefits.	✓ Requirement Met
	Costs and benefits should only be counted once; there can be no double-counting of benefits.	✓ Requirement Met
	All costs and benefits used in the analysis should be incremental to the investment when compared with a baseline or "business as usual" scenario. The baseline scenario should reflect the related costs or benefits that would be anticipated if the investment were not made.	✓ Requirement Met (Costs and benefits were analyzed to ensure only incremental values were used)
	The cost-benefit analysis should recognize as a separate line item any stranded costs that would result from the smart grid investment.	✓ Requirement Met

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
1. Provide cost-benefit analyses of the investment(s), including a Total Resource Cost test: (cont'd)	The utility should be required to present multiple views, or perspectives, as part of their cost-benefit analysis to be filed with the Commission. • A Total Resource Cost perspective for investments should be presented by the utilities – both with societal costs and benefits and without societal costs and benefits • Other perspectives that should be presented include a Ratepayer Impact view (depicting how rates would be impacted) and a Customer/Participant view (depicting the impacts of customer-specific costs and benefits) As appropriate to each test, the cost-benefit analysis should separately identify: 1) Those costs and benefits that will be directly incurred or realized by ratepayers through the traditional ratemaking structure 2) Those costs that can be expected to be incurred by non-utility parties 3) Those benefits that will flow, if at all, through the wholesale price of energy or other markets 4) Those benefits associated with broader societal objectives or results that are not necessarily reflected in regulated customer rates.	✓ Requirement Met (Both a customer/ratepayer impact and Total Resource Cost views are included in this analysis)
	Cost-benefit analysis may bundle or package together investments in several applications if those applications are needed to function together or provide otherwise unachievable synergies, or if they are reliant on a common infrastructure investment. To the extent that it is feasible to separate underlying platforms from individual applications, smart grid applications contained within a package should still be subject to individual cost-benefit analysis based on their stand-alone incremental costs and benefits.	✓ Requirement Met (Ameren Illinois views the AMI investment as a comprehensive capability that is considered as a whole)
	Cost-benefit analysis should provide a calculation of a payback period based on the present value of the annual cash flows of the smart grid investment or package	✓ Requirement Met
	Potential non-regulated, third party, or incidental revenue from smart grid infrastructure investments should be reflected in the cost-benefit analysis.	N/A (This analysis does not include non-regulated or third-party/incidental revenue)

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
2. Provide documentation supporting the cost-benefit analyses	Documentation of key assumptions underlying the analyses, particularly of those factors that may have a high degree of variability and/or uncertainty	✓ Requirement Met
	Discussion of the uncertainties associated with estimates of costs and benefits over the term of the payback period	✓ Requirement Met (Included a sensitivity analysis – see section 7)
	Discussion of the potential change in benefits and costs that may occur over time assuming various implementation schedules	✓ Requirement Met
	Identification and discussion of other investments or approaches (if any) that reasonably might achieve similar or better results	✓ Requirement Met (Multiple AMI and MDM vendor solutions will be evaluated as a part of the project to identify the best-fit solution)
	Documentation of the discount rates used in the analyses and a discussion of the rationale for their use	✓ Requirement Met
	Documentation of a sensitivity analysis of the projected costs and benefits of the investment to variables and assumptions. While reasonable discretion should be provided in terms of the variables and assumptions to be included, the sensitivity analysis should: – Identify the key variables from the cost-benefit analysis that merit sensitivity analysis. The degree of participation, assumed behavioral impacts, and persistence of customer behavior changes should be among the variables included in sensitivity analyses. Other candidates for inclusion are variables (such as emission costs and reliability) that have a wide range of potential values and/or are more subjective in nature. – Produce cost-benefit results using alternate values for the variables in order to demonstrate the sensitivity/impact various scenarios might have on the economic profile of the smart grid investments.	✓ Requirement Met
	Discussion of the rationale behind the packaging or bundling of applications in the analyses	✓ Requirement Met (Ameren Illinois views the AMI investment as a comprehensive capability that is considered as a whole)

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
	Documentation of the investment's useful life and the basis for its determination	✓ Requirement Met
2. Provide documentation supporting the cost-benefit analyses (cont'd)	Documentation of the length of time over which reasonable customer benefits can be reliably estimated	✓ Requirement Met
	Documentation of assumptions regarding any environmental benefits incorporated in the analysis (e.g., emissions reduced, values of emissions/allowances)	✓ Requirement Met
	Discussion of the methodology and assumptions used in deriving the estimated benefits from load shape changes. This discussion should describe the model(s) used, model inputs and outputs, model logic (at a high level), scenarios performed, and how model results are to be interpreted.	✓ Requirement Met (This analysis includes a high-level summary of the Demand Response benefit methodology, which is based on peak load shifting)

3. Ameren Illinois AMI Program Costs

Ameren Illinois has conducted detailed cost assessments to determine the life cycle cost of AMI ownership, as well as the capital and operations and maintenance (O&M) costs associated with AMI deployment. AMI deployment is expected to be completed within 8 years. Operations of the AMI infrastructure will commence prior to the AMI system installation and continue through the timeframe of the business case.

The major cost components of the AMI deployment are summarized in the table below.

Table 2: Key Cost Components (in $ millions, over 20 years)

Key Cost Components	Capital	O&M	Total
AMI Meter and Communications Infrastructure and Implementation	$129	$0	$129
IT Systems and Integration	$111	$183	$294
Project Management	$16	$0	$16
AMI Operations	$16	$53	$69
Manual Methods to Meet Performance Metrics	$0	$5	$5
Demand Response/Energy Efficiency Program Costs	$0	$53	$53
TOTAL	**$272**	**$294**	**$566**

3.1. AMI Metering Equipment and Communications Infrastructure Implementation

This cost category includes the capital costs associated with the installation, configuration and customization of the AMI metering and communications systems. This also includes O&M costs associated with accelerated depreciation of existing meters.

Ameren Illinois estimates that the 20-year capital costs incurred as a result of full AMI deployment within 8 years will be approximately $129 million. Below is a summary of the main components of these costs.

Table 3: AMI Metering Equipment & Communications Infrastructure Cost Breakout (in $ millions, over 20 years)

AMI Metering Equipment and Communications Infrastructure Cost Drivers	Capital	O&M	Total
AMI Meters	$82	$0	$82
AMI Meter Installation	$27	$0	$27
AMI Communications Network Hardware & Installation	$20	$0	$20
Accelerated Depreciation for Existing Meters	$0	$0	$0
TOTAL	**$129**	$0	**$129**

Capital costs include costs of AMI meters and communications, as well as installation and project management costs. The cost estimates were derived from the AMI vendor RFI's and RFP's that were issued in 2011 and 2012.

AMI meter costs include the costs for the physical AMI meter for single-phase and three-phase meters having embedded two-way RF radio communicators. All self-contained meters that are 200 Amps or less will also have an internal switch for remote connect / disconnect applications. This cost is based on a 62% deployment, an annual growth rate of 0.25% on an initial meter count of 780,419 AMI meters, over 8 years.

Installation of meters is a complex activity involving pre-installation preparations and field deployment. During pre-installation, facilities are prepared for AMI meter processing, field surveys are completed, and plans are developed for meter deployment. Network preparation, including right of ways and interagency permissions are obtained. During field deployment, the meters are actually installed at the customer premises (and the existing meter is taken out of service).

Meter deployment is major activity. It involves setting up cross-dock facilities as logistical hubs for meter deployment. Meters are checked for performance and accuracy before deployment. The workforce is trained and deployed to cross-dock facilities. Deployment is scheduled based on route plan. Meters are installed, and clean-up is performed to complete the installation process. Tests of meter communication and data accuracy are performed as a part of commissioning.

The AMI communications network hardware and installation phase involves the physical roll-out of the communications infrastructure (collection points, wide area network (WAN) hardware) in the field and within Ameren Illinois facilities (head-end communications equipment). First, the communications network is installed in each operating center area to provide immediate visibility to the meters that will be installed. Network communication implementation includes field survey, installation of communication equipment and testing of communication equipment. It is estimated that there will be a number of collection points across the Ameren Illinois service territory.

The final cost driver related to the AMI Metering Equipment implementation is the accelerated depreciation for the existing non-AMR meters and applicable AMR meters & infrastructure. Since the AMI meters will be rolled out to 62% of customers over the 8 year deployment period, all existing non-AMR meters as well as a small portion of AMR meters will be replaced during that timeframe. Many of these meters will still have a depreciable life remaining at the point they are replaced. Therefore, the costs for accelerating the remaining depreciation for these meters are included in this analysis, which is consistent with the guidelines recommended by the Illinois Statewide Smart Grid Collaborative.

The existing depreciation schedule calls for depreciation on existing meters (both AMR and non-AMR) to total $85 million in 2013-2032 and $2 million in 2033 and beyond. The accelerated depreciation schedule for the existing meters based on AMI implementation totals $87 million in 2013-2019. While the total depreciated is the same for the existing & accelerated schedules (including years after 2032), the difference between the existing & accelerated depreciation for each year is included in the cost estimates. The accelerated depreciation of meters that will be replaced by AMI meters has a minimal overall impact.

3.2. IT Systems and Integration

This cost category includes the implementation costs associated with the IT systems and integration hardware, software, development, security and project management, as well as the ongoing maintenance of these systems. Ameren Illinois estimates that the 20-year capital and O&M costs incurred as a result of 62% AMI deployment within 8 years will be approximately $294 million.

Key components of AMI-related IT systems:

- AMI IT systems include head-end systems to communicate with the AMI network, capture meter data and send control commands to the meter.

- Head-end systems transfer data to a Meter Data Management System (MDMS) where meter data is validated against acceptance rules to ensure data quality. Estimations are done for missing data and edits are made to some data elements.
- Storage systems are needed, as meter data increases exponentially over current needs, increasing the importance of systematic data management.
- Data will need to be shared by several systems, and it requires an integration platform to allow sharing of the information between various enterprise systems (e.g. providing data for various applications such as billing, customer service and customer analytics).
- Security of the AMI network, including planning and implementation of security architecture to protect customer and operational data, is required.

Table 4: IT Systems and Integration Cost Breakout (in $ millions, over 20 years)

IT Systems and Integration Cost Drivers	Capital	O&M	Total
Hardware	$12	$12	$24
Software	$1	$57	$58
Labor	$73	$73	$146
Security and planning	$1	$5	$6
Project Management	$18	$4	$22
Operations	$5	$30	$35
Asset Management Planning Support	$1	$2	$3
TOTAL	**$111**	**$183**	**$294**

Ameren Illinois estimates capital costs for IT systems and integration to be approximately $111 million over 20 years.

Outlined below are further details on the key elements of Ameren Illinois' anticipated AMI IT infrastructure:

- Hardware
  - Servers for Enterprise Service Bus (ESB)
  - Network Operations Hardware

- Software
  - AMI Head End
  - Application Servers & Database Servers
  - Meter Data Management System
  - Data Analytics Software
  - ESB Tools

- Labor
  - Key activities include:
    - AMI & MDMS Design and Implementation
    - MDMS Integration
    - AMI Integration
    - ESB Integration
    - Environment Set Up, Installs, etc.
    - Data Analytics Support

- Security and Planning

  - Costs have been estimated for the planning, designing, and building of security systems and protocols to securely transmit data within the network.
  - On-going IT system security administration will incur additional costs

- Project Management
  - Key activities include centralized training, personnel recruiting, employee communications, and miscellaneous start-up related activities
  - Vendor oversight of the Request for Proposals (RFP) process and contracts supervision will also bear additional costs
  - Other management overhead costs spanning two or more functional cost categories, such as project management and the administration of job skills training, are also included in this cost category

- Operations
  - Costs have been allocated for on-going application support, post production support / transition, upgrade, and maintenance for AMI-related IT systems

Both Ameren Illinois resources and contractor resources will be employed for support and maintenance of IT systems. Furthermore, fees will need to be paid to vendors for product support and servicing.

Asset Management Planning Support costs include the development of enhanced asset planning analysis tools and software to enable better forecasting and planning. Additionally, there is an on-going maintenance cost for the tools and software that will be developed.

3.3. Program Management

A long-term strategic initiative such as AMI deployment requires a substantial amount of resources for program delivery activities. Ameren Illinois estimates that $16 million will be needed to fund program management activities.

Table 5: Program Management Cost Breakout (in $ millions, over 20 years)

Program Management Cost Drivers	Capital	O&M	TOTAL
Program Management	$16	$0	$16

Program Management activities include

- **Governance:** Oversight, program prioritization and approval, establishing program sponsorship and accountability,
- **Quality Management:** The development and management of standard processes and practices to manage quality across the program
- **Program Scheduling and Staffing**: The management of integrated timelines and dependencies; securing and allocating resources to satisfy demand in a timely manner
- **Issue and Risk Management:** A standard methodology and tool for reporting, prioritizing, and escalating issues to ensure timely resolution; the development and management of standard risk identification and response capabilities to manage risk across the program
- **Project Communications and Reporting**
- **Financial/Benefits Realization and Regulatory Management:** The management and production of financial planning and reporting; management of benefits realization and business cases to ensure business benefits are measured and achieved; single point of contact to manage compliance with requirements of Commission

- **Change Control Process:** The management and prioritization of new projects or new requirements, including change orders
- **Release Management:** The management of an integrated release strategy to support organization-wide prioritization, dependencies and risk
- **Sourcing Strategy and Management:** Single point of contact to manage compliance with requirements of legal department
- **Vendor/Contract Management:** Integrated management of key vendors, including contractual, administrative and communication functions
- **Employee communications:** Managing communications with internal audiences, external audiences, and executives to ensure common messages, executive sponsorship and appropriate stakeholder involvement

The program management work will be performed by a combination of internal and external resources.

3.4. AMI Operations (Start-up and On-going)

This category of costs represents the costs of start-up and on-going operations for supporting AMI operational activities throughout the business case evaluation period of 20 years. As outlined in Table 6, AMI operational costs include costs for metering operations, communications operations and consumer education. The 20-year total cost in this area is $69 million, of which $16 million is capital and $53 million is O&M.

Table 6: AMI Operations Cost Breakout (in $ millions, over 20 years)

AMI Operations Cost Drivers	Capital	O&M	TOTAL
Metering Operations	$8	$9	$17
Communications Operations	$8	$32	$40
Consumer Education	$0	$12	$12
TOTAL	**$16**	**$53**	**$69**

3.4.1. Metering Operations

Metering operations includes all costs related to managing Ameren Illinois' AMI metering operations during implementation and on an on-going basis. Included in this are the following areas:

- **Meter Inventory Management:** Managing the inventory for 780,419 meters over the 8-year rollout
- **Meter Maintenance:** Performing routine maintenance and repairs to meters that fail
- **Meter Warehousing:** Facility costs for housing the meter inventory, especially during the initial rollout
- **Meter Testing and Make-ready:** Initial testing of meters before installation to ensure the meters are fully operational
- **Meter Technical Support**: Diagnosing problems when meters experience issues
- **Meter Field Services:** Implementation-related service calls after AMI meters are installed

3.4.2. Communications Operations

Communications operations include all aspects of maintaining and operating the AMI communications network. This includes WAN backhaul charges, as well as costs for maintaining the AMI communication networks to ensure availability for continuous AMI operation. Also included are rent/charges for using shared facilities in some places, such as communication backhaul and repeater equipment. FTEs include network operations engineers, field / telecom operations technicians and supervisors, as well as NOC infrastructure specialists.

3.4.3. Consumer Education

The success of AMI program is contingent on the ability of Ameren Illinois to communicate with customers, with a specific focus on educating them on the safety and capabilities of the AMI system. The focus is to enable the customer so that customer direct benefits are maximized. This also includes both broad public education and specific customer education on the positive impacts of AMI technology, implementation success stories, how AMI creates value in energy conservation, and/or specific details on participation in Demand Response/Energy Efficiency programs. In addition, customer education efforts will include instruction on how to use customer self-service and web portal tools. Details on the customer education program can be found in the AMI Plan document.

3.5. Manual Methods to Meet Performance Metrics

This category of costs represents the costs of the manual methods required to supplement the AMI delivered benefits in order to meet Ameren Illinois' AMI-related performance metrics as established in Illinois Public Acts 97-616 and 97-646. Ameren Illinois estimates that, since the deployment of AMI meters won't begin until 2014 and will end in 2019, the AMI system won't be fully operational and deployed in time to meet the performance metrics, specifically in the areas of disconnects to reduce Consumption on Inactive Meters (CIM) and estimate bills. As outlined in Table 7, the 20-year total costs in this area is $5 million O&M, of which $4 million is related to the CIM metric and $1 million is related to the estimated bill metric.

Table 7: Manual Methods to Meet Performance Metrics Breakout (in $ millions, over 20 years)

Manual Methods to Meet Performance Metrics	Capital	O&M	Total
Disconnects to Meet CIM Metric	$0	$4	$4
Manual Meter Reads to Meet Estimated Bill Metric	$0	$1	$1
Disconnects to Meet Uncollectibles	$0	$0	$0
TOTAL	**$0**	**$5**	**$5**

3.5.1. Disconnects to Meet CIM Metric

In order to reduce consumption on inactive meters, Ameren Illinois estimates that additional physical disconnects will need to occur to prevent usage on accounts that have had their service stopped. The AMI system will ultimately provide the capability to remotely physically disconnect electrical service to customers that have stopped service on their account. Until the AMI system is fully deployed and operational, additional manual disconnects will need to occur to meet the performance targets. Ameren Illinois estimates that an additional 4,800 manual disconnects on average will need to occur each year in the 2013-2022 timeframe, resulting in approximately $4M of additional costs.

3.5.2. Manual Meter Reads to Meet Estimated Bill Metric

In order to reduce estimated bills, Ameren Illinois estimates that additional meter reads will need to occur. The AMI system will ultimately provide the capability to remotely read a meter on demand to address situations where an estimated bill would normally be issued. Until the AMI system is fully deployed and operational, additional manual meter reads will need to occur to meet the performance targets.

3.5.3. Disconnects to Meet Uncollectibles

In order to reduce the amount of uncollectible revenue that is written off each year, Ameren Illinois estimates that additional physical disconnects will need to occur to prevent additional usage on accounts that are overdue. The AMI system will provide a remote disconnect capability that will address this need once the AMI system is fully implemented. Ameren Illinois estimates that additional manual physical disconnects will only need to occur to meet the performance metrics in 2022, so the there are minimal costs included in the cost / benefit analysis.

3.6. Demand Response/Energy Efficiency Program Costs

This category of costs represents the Demand Response and Energy Efficiency program costs to implement Demand Response and Energy Efficiency programs. Based on cost estimates developed by the Institute for Electric Efficiency for enabling Demand Response/Energy Efficiency technologies, detailed cost estimates were developed. The technologies are based on digital electronics whose costs will decline significantly over the next two decades, as typically happens when technological innovation within digital technologies achieves economies of scale. A decrease in cost over the first 10 years will be at a rate of 16% per year and then fall to a decrease of 8% per year over the last 10 years.

Table 8: Demand Response/Energy Efficiency Program Costs (in $ millions, over 20 years)

Demand Response/Energy Efficiency Program Costs	Capital	O&M	Total
Demand Response	$0	$3	$3
Energy Efficiency	$0	$2	$2
PEV Enablement	$0	$13	$13
Customer Technology Interface & Support	$0	$23	$23
Customer Education – Dynamic Pricing and Technology	$0	$12	$12
TOTAL	**$0**	**$53**	**$53**

3.6.1. Demand Response

Customers will have the choice to opt-in to a Peak Time Rebate (PTR) program, Critical Peak pricing rate, Direct Load Control program, or Time of Use program with the AMI program. Costs associated with this program include technology such as in-home displays, programmable control thermostats, and home energy management systems. The AMI solution will enable the future utilization of home devices using the Industry Smart Energy Profile 2.0 standard when it is ratified and available.

3.6.2. Energy Efficiency

As customers are more aware of their use, there is a natural learning that takes place and results in overall usage reduction. The costs associated with the Energy Efficiency program include the home energy devices such as in-home displays or home energy monitors or messages customized to one's personal devices.

3.6.3. PEV Enablement

AMI combined with smart charging technologies will allow PEV owners to charge their vehicles at non-peak times when electricity rates are cheapest. The costs associated in this model are driven by the incremental cost

of electric vehicles relative to conventional vehicles. It is assumed that the PEV premium is $9,500 in 2012 and declining at a rate of 16% in the first ten years of the forecast and 8% in the last ten years.

3.6.4. Customer Technology Interface & Support

AMI when used in conjunction with Demand Response technology is an enabler to provide new options for customers who choose to opt-in to Demand Response and Energy Efficiency programs. The IT costs associated with integrating to these new systems is estimated in these costs. The integration interfaces would leverage industry standard interfaces where applicable such as NIST standards for integrating to new head-end Demand Response system (DRMS), Green Button interfaces for customer web portals, and interfaces to third-party vendors providing additional enabling technologies that may be leveraged by Ameren Illinois customers in the future.

3.6.5. Dynamic Pricing and Technology Education

Ameren Illinois understands significant pricing program and AMI/technology integration benefits can accrue to customers. Ameren Illinois has incorporated costs to engage and inform consumers on how those benefits enabled by AMI can be achieved. An ongoing part of Ameren Illinois' Consumer Education efforts, Ameren Illinois intends to communicate through multiple channels to instruct customers on using AMI enabled programs and technologies.

Ameren Illinois estimates that an annual budget of $0.5 million will be spent to inform and educate customers on the availability of AMI enabled pricing programs, technologies, and their benefits.

4. Ameren Illinois AMI Program Operational Benefits

Ameren Illinois has conducted a thorough assessment of all the operational benefits that it expects to accrue through 62% AMI implementation within 8 years. Included in this analysis are direct operational benefits realized by Ameren Illinois and passed along to customer rates. These benefits are evaluated over a 20 year period and are expressed in incremental terms over the "business as usual" case.

The following methodology was utilized to calculate steady-state benefits associated with the AMI implementation:

(1) Define the value drivers of the AMI solution components
(2) Identify and isolate the affected baseline costs and revenues that will be impacted
(3) Research and identify relevant cost savings and/or loss prevention percentages to be applied to the affected baseline

Over 20 years, Ameren Illinois expects financial benefits of approximately $582 million. The following table outlines a summary of the major quantifiable benefits expected out of the AMI implementation.

Table 9: Key Benefit Drivers (in $ millions, over 20 years)

Benefit Category	Cumulative Benefits
Reduction in Meter Reading Costs	$238
Reduction in Field & Meter Services	$209
Reduction in Unaccounted for Energy	$41
Efficiency Improvement in Customer Care	$15
IT Cost Savings	$5
Improved Distribution System Spend Efficiency	$42
Outage Management Efficiency	$32
TOTAL	**$582**

4.1. Reduction in Meter Reading Costs

Ameren Illinois has been an early adopter of automated meter reading, with its Illinois program starting in the 1990s and aggressively expanding throughout the state from 2006 through 2010. Today, approximately 680,000 electric meters are automated – representing more than half of Ameren Illinois' electric customers. As a result of this automated meter reading, many of the meter reading labor benefits have been previously realized. Reduction in meter reading costs from the remaining 574,000 manual electric meters represents the largest area of benefits expected from Ameren Illinois' AMI implementation plan. Meter reads that are traditionally conducted through physical site visits to the customer premise can instead be done remotely through the AMI system. Benefits associated with reduction in meter reads represent the reduction in manual meter reading labor costs, associated IT costs, as well as vehicle / transportation costs.

Ameren Illinois estimates that 62% deployment of AMI over 8 years will result in meter reading cost savings of $238 million over a 20 year period.

Table 10: Meter Reading Cost Savings Breakdown (in $ millions, over 20 years)

Reduction in Meter Reading Costs	Cumulative Benefits
Reduction in Manual Meter Reading Expenses	$176

Reduction in Meter Reading Costs	Cumulative Benefits
Reduction in AMR Meter Reading Expenses	$50
Reduction in Manual and AMR Meter IT Costs	$3
Reduction in On-Cycle Meter Reading Vehicle Expense	$9
TOTAL	**$238**

4.1.1. Reduction in Manual Meter Reading Expenses

Of the 574,000 electric meters that are manually read, 45% of on-cycle reads are performed utilizing internal Ameren Illinois labor while the remaining reads are performed by contractors. Cost savings through the reduction in manual meter reads will be realized through a reduction in both in-house and contractor labor costs.

Meter reader workforce reductions are planned over the course of the 8-year AMI implementation, and Ameren Illinois is planning to realize these workforce reductions through natural attrition and work re-assignment over time.

Quantifiable benefits related to manual meter reading savings are expected to be $176 million over a 20 year business case time horizon. These cost savings take into account meter reads conducted by both internal meter readers as well as external contractors.

4.1.2. Reduction in AMR Meter Reading Expenses

Ameren Illinois expects to begin replacing approximately 200,000 of its 680,000 AMR meters with AMI meters starting in year 2018. All costs associated with AMR meter reading in the form of fees paid to external vendors will be eliminated as AMI meters replace existing AMR meters.

By eliminating these AMR costs over the AMI implementation time frame, Ameren Illinois expects to realize cost savings related to AMR meter reading of approximately $50 million over a 20 year business case time horizon.

4.1.3. Reduction in Manual Meter IT Costs

O&M costs associated with the IT systems that support existing manual meter reads will be eliminated with the deployment of AMI meters. Benefits include cost savings associated with the support and upgrade of meter reading devices as well as software licensing and maintenance.

The current cost to support the existing MVRS hardware and software is roughly $175,000 per year. Ameren Illinois expects to be able to save 60% of these costs after deployment.

Ameren Illinois estimates reduction in manual meter IT costs to be approximately $3 million over the 20 year business case time horizon.

4.1.4. Reduction in On-Cycle Meter Reading Vehicle Expense

As non-AMR meters get replaced by AMI smart meters, the reduction in the need for manual meter reads will result in a reduction in associated vehicle costs for Ameren Illinois. Vehicle-related benefits include cost savings from fewer vehicles, fuel costs, vehicle insurance, and vehicle maintenance.

The current annual cost to operate and maintain vehicles for meter reading purposes is approximately $500,000. With AMI, Ameren Illinois expects reduction in manual and special meter reads to reduce vehicle costs by approximately $9 million over the 20-year business case time horizon.

4.2. Reduction in Field and Meter Services

AMI's smart metering and communication infrastructure enables utilities to perform several functions remotely that would otherwise require a field visit to the customer premise. As a result, significant cost savings through the reduction in the number of personnel and vehicles for field and meter services can be achieved. Benefits in this area can be seen in the reduction in manual disconnect / reconnect of meters, single light outages, need for manual re-reads, as well as customer equipment problem outages.

Ameren Illinois estimates that 62% deployment of AMI over 8 years will result in meter reading cost savings of $209 million over the 20 year business case time horizon.

Table 11: Field and Meter Savings Breakdown (in $ millions, over 20 years)

Reduction in Field & Meter Services	Cumulative Benefits
Reduction in Manual Disconnect / Reconnect of Meters	$116
Reduction in Manual Off-Cycle / Special Meter Reads	$62
Reduction in Field Services Vehicle Expense	$14
Reduction in "OK on Arrival" Outage Field Trips	$11
Reduction in Customer Equipment Problem Outages	$ -
Salvage Value of Replaced Meters	$1
Reduction in Nuisance Stopped Meter Orders	$5
TOTAL	**$209**

4.2.1. Reduction in Manual Disconnect / Reconnect of Meters

The remote connect / disconnect feature of AMI smart meters enables utilities to turn on and off services for new and cancelled accounts remotely without a field trip. This benefit not only applies to the ability to turn on and off services for regular move-in / move-out of customers, but also provides the ability to cancel service for non-paying customers. As a result, significant cost savings can be realized through the reduction in need for personnel and transportation costs to turn on / off services. Cost savings will also be seen through the time saved due to reduction in meter access challenges as a result of AMI.

From 2009 to 2011, Ameren Illinois received about 247,000 orders for electric disconnect / re-connect per year, of which about 89,000 per year were disconnects for non-pay. The labor cost for manual disconnect / reconnect is approximately $6 million per year currently. Ameren Illinois expects cost savings of approximately $116 million from reduced labor associated with the ability to remotely turn on/off energy service over 20 years.

4.2.2. Reduction in Manual Off-Cycle / Special Meter Reads

Ameren Illinois currently incurs significant costs to conduct manual off-cycle special meter reads. These reads are conducted for tenant changes, re-reads, high bill inquiries, and other instances when a reading is needed off the normal read cycle reads etc. Labor cost savings will be realized through reduction in off-cycle / special meter reads as a result of AMI.

In 2011, Ameren Illinois conducted approximately 100,000 off-cycle reads. Quantifiable benefits related to off-cycle meter reading savings are expected to be approximately $62 million over a 20 year business case time horizon.

4.2.3. Reduction in Field Services Vehicle Expense

With the reduction in field service visits to customer premises due to the above factors, there will also be a reduction in associated vehicle costs for Ameren Illinois. Vehicle-related benefits include cost savings from fewer vehicles, fuel costs, vehicle insurance, and vehicle maintenance.

The total benefit Ameren Illinois expects to realize through reduction in off cycle field services vehicle expense will be approximately $14 million over the 20-year business case time horizon.

4.2.4. Reduction in "OK on Arrival" Outage Field Trips

AMI implementation is expected to result in cost savings associated with reduced outage "OK on Arrival" field trips to customer premises. With the ability to provide near real-time power and outage status information, AMI systems are able to test for loss of voltage at the service point and both detect outage conditions as well as obtain restoration status indication. As a result, "OK on Arrival" field trips will be virtually eliminated, in AMI areas, thereby leading to cost savings.

Ameren Illinois currently works about 7,600 orders for outages (both storm and non-storm related) that upon investigation are found to be "OK on Arrival". Ameren Illinois estimates that it will realize financial benefits related to reduction in "OK on Arrival" field trips of approximately $11 million over the 20-year business case time horizon.

4.2.5. Reduction in "Customer Equipment Problem" Outage Field Trips

With AMI, Ameren Illinois will be able to determine whether the cause of an outage is the result of an electrical problem with the customer's equipment. This automated determination will help save dispatch labor and transportation costs for customer incidents that involve equipment failure.

Ameren Illinois estimates that while approximately 90% of "Customer Equipment Problem" related field trips can be eliminated as a result of AMI, 10% of orders will still require a field trip due to problems inside the meter base. Cost savings of approximately $400,000 are expected over a period of 20 years.

4.2.6. Salvage Value of Replaced Meters

A small financial benefit of replacing electro-mechanical and AMR meters as part of Ameren Illinois' AMI deployment plan is the salvage value of meters that have remaining useful life.

Ameren Illinois has estimated a conservative salvage value of $1 per meter, thereby leading to benefits of approximately $1 million for the utility over the 20-year business case time horizon.

4.2.7. Reduction in Nuisance Stopped Meter Orders

Currently, Ameren Illinois receives approximately 34,700 orders for stuck / stopped electric meters annually. Of these, approximately 30% of the orders are found to be invalid / nuisance by the field & meter services

personnel. With AMI, Ameren Illinois will be able to remotely detect whether the meter is stopped or malfunctioning, thereby eliminating the need for a premise visit to address an invalid stopped meter order.

Over the 20-year business case time horizon, Ameren Illinois expects benefits of approximately $5 million related to reduction in nuisance stopped meter orders.

4.3. Reduction in Unaccounted for Energy

Unaccounted for Energy (UFE) in the areas of meter tampering, energy theft, meter inaccuracy, and dead / stopped meters results in significant revenue loss for utilities. Through the use of smart meters and sophisticated MDM systems, UFE can be detected early and revenue losses related to unmetered energy can be reduced.

Ameren Illinois estimates that 62% AMI implementation in 8 years will help increase revenue from reduction in UFE by $41 million over a 20 year period.

Table 12: Field and Meter Savings Breakdown (in $ millions, over 20 years)

Reduction in Unaccounted for Energy	Cumulative Benefits
Theft / Tamper Detection & Reduction	$36
Faster Identification of Dead Meters	$5
TOTAL	**$41**

4.3.1. Theft / Tamper Detection & Reduction

AMI systems significantly aid in the early detection of meter tampering and energy theft. Through the use of analytics software and AMI functionality that enables frequent recording of smart meter energy consumption, the detection of anomalous patterns of energy resulting from theft and tampering can be discovered. According to Chartwell, a market research company for utility customer care, marketing and smart grid, theft is estimated at 1% of a utilities' revenue.[2] Thus, the use of AMI can significantly reduce energy and revenue losses associated with energy theft.

In reviewing various public utility AMI filings, Ameren Illinois observed that other utilities estimated savings in the range of 0.5% - 1% of revenue associated with each AMI meter. Ameren Illinois conservatively estimates that AMI will help the utility save 0.25% of theft / tamper-associated revenue. This will result in cutting existing residential line losses by about 2.9%. Over a 20 year period, Ameren Illinois expects financial benefits from reduction in energy theft for residential customers to be approximately $36 million.

4.3.2. Faster Identification of Dead Meters

The implementation of AMI systems helps utilities more quickly identify dead and/or stopped meters that can no longer measure electricity due to meter failure. This early identification helps utilities quickly take steps towards repairing or replacing the dead meter, thereby reducing potential revenue losses.

[2] Chartwell Report, 11th Edition on AMI/AMR

Ameren Illinois currently receives approximately 3,470 valid orders annually for dead residential meters with average residential consumption of about 1,000 kWh per month. With the use of AMI and a charge back period of 60 days, Ameren Illinois expects to realize financial benefits associated with the early identification of dead meters of approximately $5 million over a 20 year time period.

4.4. Efficiency Improvements in Customer Care

An important benefit of AMI is the cost savings realized through efficiency improvements in customer call volume and management. Meter reading errors are expected to be virtually eliminated and the need for calculation of estimated bills due to access issues will be significantly reduced, in AMI areas. Efforts to raise awareness regarding AMI through marketing campaigns and customer education will increase customer adoption of self-service leading to an overall reduction in call volume. However, more complicated billing problems may increase due to expanded dynamic pricing. The potential to reduce float between meter read and customer billing will also drive greater benefits for Ameren Illinois.

Over a 20 year period, Ameren Illinois estimates $15 million in cost savings through efficiency improvements in customer call volume and management as a result of AMI.

Table 13: Efficiency in Billing Breakout (in $ millions, over 20 years)

Efficiency Improvement in Billing and Customer Management	Cumulative Benefits
Reduction in Estimated Bills	$-
Reduction in Call Volume	$13
Reduction in Float between Meter Read and Customer Billing	$1
Reduction in Customer Accounts Back-office Costs	$1
TOTAL	**$15**

4.4.1. Reduction in Estimated Bills

The ability to remotely read meters on a frequent basis greatly reduces estimated bills that often result from meter access issues that currently prevent meter readers from obtaining reads in hard to access areas at the customer premise. Fewer customer service resources are thus expected to review exception reports, resolve billing errors and process adjustments.

Ameren Illinois has already received these benefits in its existing AMR areas. While it is believed that a reduction in estimated bills from its non-AMR areas will result in reduced workload for Ameren Illinois' Customer Accounting Department, there is likely to be an increase in more complicated billing problems due to expanded dynamic pricing. At this point, Ameren Illinois is taking a conservative approach and assuming that AMI will have a neutral effect on its Customer Accounting Department.

4.4.2. Reduction in Customer Call Volume

Comprehensive marketing campaigns and customer awareness programs will educate customers about the self-service options available to them from Ameren Illinois throughout the AMI roll-out.

Ameren Illinois receives approximately 5 million calls annually related to customer inquiries. Ameren Illinois is currently planning on further developing its customer self-service capabilities, including web and IVR enhancements channels. Ameren Illinois plan to increase the self-service marketing efforts during the AMI roll-

out, encouraging portal use and promoting self-service within AMI communications. Ameren Illinois estimates it will see approximately a 5% reduction in call volume as a result of greater self-service adoption. This will also be driven by lower bill inquiry call volume due to reductions in estimated bills. The reduction in call volume over the 20 year business case time horizon will produce $13 million in cost savings.

4.4.3. Reduction in Float between Meter Read and Customer Billing

Ameren Illinois expects AMI to enable all accounts within AMI territories to be billed on the second day of the billing window. As a result of AMR implementation, Ameren Illinois is already able to receive a majority of its meter readings on the second day within the window. However, the remaining bills (about 20%) that are currently produced during the third and fourth days will now be generated during the second day as a result of AMI. This will accelerate Ameren Illinois' revenue stream and improve its cash flow.

Over the 20 year business case time horizon, Ameren Illinois expects benefits related to reduction in float between meter read and customer billing of approximately $1 million dollars.

4.4.4. Reduction in Customer Accounts Back-office Costs

Detailed information regarding the status of each AMI meter will allow Ameren Illinois to detect stopped or faulty meters on a real-time basis. Currently, meters that have stopped or are not registering an accurate reading as a result of device failure require a manual intervention to investigate the issue. Through the implementation of AMI, Ameren Illinois expects to be able to reduce the back-office effort required to intervene on a stopped meter incident.

Over the 20 year period, the reduction in customer accounts back-office costs is estimated at $1 million dollars through a reduction in effort required to address stopped meters.

4.5. IT Cost Savings

Ameren Illinois currently uses 1.5 FTEs to support its existing Meter Data Management (MDM). Furthermore, in addition to the $36,000 it pays in annual software maintenance fees, it has also budgeted associated hardware purchase and upgrade costs. These costs will thus not be incurred for the AMI project, resulting in a benefit of $5 million over the 20 year evaluation period

4.6. Improved Distribution System Spend Efficiency

Ameren Illinois also expects AMI to enable improvements in the distribution system planning efforts. AMI will provide detailed information across the distribution network that can be used to optimize investments in infrastructure improvements. Examples of data available by AMI that can be used in asset management are:

- Interval (time-based) consumption data at the customer level (and ability to aggregate up to transformer and circuit levels)
- Voltage information collected at each premise
- Momentary outage information

The total benefit from Improved Capital Spend Efficiency over the 20-year business case timeframe is $42 million.

Table 14: Asset Management Benefit Breakout (in $ millions, over 20 years)

Improved Capital Spend Efficiency	Capital	O&M	Cumulative Benefits
Distribution System Management	$12	$1	$13
Asset Management Planning	$8	$6	$14
Avoided Meter Purchases	$15	$0	$15
TOTAL	**$35**	**$7**	**$42**

4.6.1. Distribution System Management

Interval consumption data can be aggregated at the transformer level to help identify under-used and over-loaded transformers, as well as to properly size replacement transformers.

From 2006 through 2011, the average capital investment by Ameren Illinois in the low voltage distribution system was approximately $81 million per year, while the average O&M expense for the maintenance of overhead lines, underground lines, and line transformers was $75 million per year.

At 62% AMI deployment, Ameren Illinois expects 1% capital savings and 0.1% reduction in O&M expenses related to low voltage distributed system management. Over the 20-year business case time horizon, this results in total benefits of approximately $13 million, which is comprised of $12 million in capital savings and $1 million in O&M avoided cost.

4.6.2. Asset Management Planning

Information received through AMI will provide more granular level system health and performance details. Using more detailed information from AMI enables Ameren Illinois to more accurately forecast load growth and evaluate system investments resulting in improved asset planning and strategies.

Over the 20 year business case time horizon improved asset planning and strategies will enable resource leveling and result in a total benefit of $14 million.

4.6.3. Avoided Meter Purchases

This benefit category represents the cost savings realized by not having to replace existing non-AMR and AMR meters on an annual basis without AMI implementation. These include cost savings from reduced additions (meter costs), reduced replacements (meter costs), as well as reduced meter testing and installation costs (labor and material). The benefit from avoided meter purchases, however, is partially offset by the cost of on-going replacement of AMI meters due to normal failure rates.

With an expected meter replacement rate of 3% and a meter addition rate of 0.25% annually, Ameren Illinois estimates cost savings from avoided meter replacements at approximately $15 million over 20 years.

4.7. Outage Management Efficiency

AMI will enable Ameren Illinois to obtain automated outage notification from the smart meters, receive specific location information as well as verify when power has been restored. These features will allow crews to be deployed more efficiently to outage areas further improving crew management efficiency. Additional truck rolls

will also be eliminated by verifying, remotely, that all customers in an area have been restored before dispatching the crew to the next location.

With the implementation of AMI, outage restoration spend will improve by 10% resulting in $32 million of cost savings, $17 million in Capital and $15 million in O&M, over the 20 year business case time horizon.

Table 15: Outage Management Benefit Breakout (in $ millions, over 20 years)

Improved Outage Management Efficiency	Capital	O&M	Cumulative Benefits
Outage Management Efficiency	$17	$15	$32

5. Ameren Illinois AMI Customer/Societal Benefits

While the above benefits are largely operational in nature and will flow to customers through Ameren Illinois and its operations and rates, other benefits from AMI will be flow directly to Ameren Illinois customers. These will be captured by customers in the form of reduced electric rates due to the avoidance of shared and pass-through costs, all things being equal.

5.1. Quantified Customer/Societal Benefits

Quantified Customer/Societal Benefits are benefits that impact Ameren Illinois customers and are realized by those customers or by society as a whole, not by Ameren Illinois.

Table 16 outlines a summary of the major quantifiable customer benefits expected out of the AMI implementation.

Table 16: Quantified Customer Benefit Breakout (in $ millions, over 20 years)

Quantified Customer Benefits	Cumulative Benefits
Reduced Consumption on Inactive Meters	$17
Reduced Uncollectible / Bad Debt Expense	$59
Demand Response	$406
Energy Efficiency	$24
PEV	$151
Carbon Reduction	$11
Customer Outage Reduction Benefit	$28
TOTAL	**$695**

5.1.1. Reduced Consumption on Inactive Meters

Ameren Illinois assigns electric meters to customer accounts and bills for usage on those meters to the assigned customer accounts. When a customer disconnects electric service at a premise (most often when they are vacating the premise), the customer account is disassociated with that electric meter. In the vast majority of cases, there is a corresponding connect request of electric service to the same premise (most often when a new occupant takes possession of a premise) on a date very close to the disconnect date.

Ameren Illinois does not physically disconnect electric service on the premise when a disconnect occurs in its existing AMR areas, and in some instances in its existing non-AMR areas. Rather, a “soft disconnect” usually occurs whereby a customer account is not associated with an electric meter during the gap between disconnect and connect. During the same gap, electric usage may still occur in some cases. Since there is not a customer account associated with the electric meter, no customer is billed for this usage.

A key feature of the AMI meters and infrastructure is the provision of a remote disconnect feature that will physically disconnect power to a premise when a disconnect request occurs. This will provide a significant decrease in unaccounted for consumption when meters are inactive.

Ameren Illinois estimates that approximately 12.1 GWh of electric energy is consumed on inactive meters on an annual basis. Ameren Illinois estimates it can reduce at least 56% of this CIM with 62% implementation of AMI and associated manual methods.

Over the 20 year business case time horizon, cumulative benefits associated with reduced consumption on inactive meters are estimated at $17 million.

5.1.2. Uncollectible Expense/Bad Debt

Ameren Illinois incurs write-off expenses of approximately $17.8 million per year for electric customer accounts that are deemed to be uncollectible. Due to the manual nature of the existing disconnect for non-pay process, timing of disconnect for non-pay orders, and the existing workload, Ameren Illinois is not able to complete all the physical disconnect for non-pay orders issued in a given year.

AMI meters and infrastructure will be used to perform a remote disconnect and re-connect based on the regulatory timeframe allowed. Ameren Illinois estimates that AMI will help it recover uncollectible expenses through both 1) completing remote disconnects for all non-pay disconnect orders typically issued, and 2) revising collection processes within existing regulations to increase the number of disconnect for non-pay orders issued. Approximately $3.5 million annual reduction in uncollectible expense is estimated after 62% AMI rollout with associated manual methods.

Over the 20 year business case time horizon, cumulative benefits associated with reduced uncollectible expense / bad debt are estimated at approximately $59 million.

5.1.3. Demand Response

Once AMI is in place, retail rates can be aligned more closely with the real-time costs of energy. Dynamic pricing and other customer programs are designed to incentivize customers to reduce load during the most expensive hours of the day, thus decreasing the aggregate electricity demand during peak times.

To quantify the potential benefits of Demand Response, Ameren Illinois expects that all Residential customers will be eligible to participate in a Peak Time Rebate program for electricity curtailed during critical peak hours. Residential customers will also have opportunities to opt-in to a Critical Peak Pricing rate with and without enabling technologies, and Direct Load Control or Time-of-Use with smart charging for electric vehicles. Commercial and Industrial customers may be on a Critical Peak Pricing Program, with or without Automated Demand Response. Additionally, certain C&I customers may qualify to participate in a Direct Load Control program. These programs may be provided by the utility or by third party service providers.

The benefits of these programs are largely driven by participation rates in the programs and the change in peak load usage per customer, valued at the appropriate avoided capacity and energy costs and avoided carbon emissions. The cost/benefit analysis assumes a likely participation scenario in which 40% of the residential customers who receive AMI will be on some type of Demand Response (mentioned previously) and 3-6% participation among Commercial and Industrial customers with AMI.

Over the 20 year Business Case time horizon the combined benefits from Demand Response are estimated at $406 million.

5.1.4. Energy Efficiency

AMI-enabled Energy Efficiency programs and technologies can contribute to increased Energy Efficiency throughout the day. When customers are more aware of their usage either by using their in-home displays or via the web, they often adjust their behavior and overall energy usage is reduced.

Over the 20 year Business Case time horizon the combined benefits from Energy Efficiency are estimated at $24 million.

5.1.5. Enabling PEVs

AMI combined with smart charging technologies will allow PEV owners to charge their vehicles at non-peak times when electricity rates are cheapest. This will lower the PEV cost per mile driven and encourage additional consumers to switch to PEVs (compared to the flat-rate case). Society will benefit from this switch since electricity is cheaper and produces less carbon dioxide per mile driven than gasoline. Assuming that 0.7 percent of vehicles among customers with AMI in the Ameren Illinois territory are PEVs (and assuming furthermore that these PEVS would not have been purchased but for AMI and time-of-use rates that lower the cost of operating these vehicles), the total 20 year Business Case nominal benefit from PEVs is $151 million.

5.1.6. Carbon Reduction

When energy emissions are lowered due to the Energy Efficiency (EE) programs described above, less carbon is emitted. Due to the smart charging of electric vehicles, there would be an increase in off-peak energy usage, emitting more carbon. However, this increase is more than offset by the reduced carbon emissions from avoided gasoline usage in conventional cars. The change in carbon emissions is monetized using the expected price of carbon in the future. Ameren Illinois assumes that the price of carbon will be zero until 2025, at which point it is $30 per metric ton in nominal terms and by 2032 it rises to $51 per metric ton.

The total 20 year Business Case benefits from reduced carbon emissions are $11 million. This includes $10 million in carbon benefits associated with Energy Efficiency gains from EE programs and $1 million from net reduced carbon emissions associated with electric vehicles.

5.1.7. Customer Outage Reduction Benefit

AMI facilitates restoring power quicker through the use of the last gasp feature of the meter and the system's ability to ping a meter. Benefits flow to customers in the form of the avoided economic losses they experience due to unreliability. For the purposes of this estimate, various industry reports were reviewed. While the value per customer class did vary slightly and different methods were found in how to value the reliability benefit, there was general consensus that the reliability benefit is an item to be considered when making smart grid investments.

Ameren Illinois utilized the ICE (interruption cost estimation) calculator, which was funded by Lawrence Berkley National Lab and DOE in conjunction with Freeman, Sullivan and Company. The methodology[3] for calculating reliability benefits involved using Ameren Illinois' SAIFI and CAIDI information, survey data from the ICE calculator, and information regarding the number of residential and small commercial customers. Large Commercial and Industrial customers were excluded from the analysis since many of these customers have backup strategies for reliability purposes.

The total 20-year customer value for outage reduction is $28 million.

[3] *The 2011 NARUC report, "Evaluating Smart Grid Reliability Benefits for Illinois"*, January 2011

5.2. Additional Customer/Societal Benefits

Additional Customer/Societal Benefits are benefits realized by the broader communities that Ameren Illinois serves, but these benefits are not strictly or wholly tied to the AMI implementation.

5.4.1. Safety and Emergency Response

With the implementation of AMI, utilities can more rapidly cooperate with fire departments and other agencies to respond to emergencies. For example, when the local fire department calls to shut down power to a burning home, the utility can quickly respond by remotely disconnecting power via the disconnect switch in the meter.

Furthermore, AMI will also impact employee and vendor safety by eliminating or reducing physical customer premises trips for meter reading, disconnections and other reasons. Safety incidents by field/meters services and meter readers are often a large portion of the overall safety incidents for utilities.

5.4.2. Local Economy

With the rollout of AMI, several jobs will be created during the 8 year field deployment, as well as new skills needed for the back office, communications and IT systems development/maintenance. This will provide a non-trivial impact to the local workforce. Macroeconomic benefits that can enhance the local economy may arise from changes in the expenditure patterns of these workers/consumers.

5.4.3. Market Competition

Competition is fostered on two levels: from a market level and from a supplier component level. With AMI, greater information on energy usage will be available. It is a common belief that the expanded service choices enabled by advanced metering and communication technology are essential if consumers are to realize the full benefits of wholesale competition.[4]

In addition, Ameren Illinois is specifying the use of standards in choosing the AMI vendor. At the endpoint, Smart Energy Profile is a key standard to foster interoperability among vendors wanting to offer services in the home energy management area. Using a non-proprietary standard-based HAN solution for the AMI system will prevent vendor “lock-in” and enable more competition for parties desiring to provide solutions.

5.4.4. Other Environmental Benefits

Electricity generation creates the majority of the U.S. sulfur dioxide (SO_2) pollution (primarily from burning coal) and is the second-largest emitter of nitrogen oxides (NOx) after vehicles. As AMI enables utilities to obtain more information and as utilities educate their customers on energy use and choice about using energy, it is expected that more customers will subscribe to various demand management programs. With the AMI-enabled pricing programs, price signals produced via the AMI devices could motivate customers to shift their energy consumption or lower it. This action would smooth out the utility’s load curve, thereby reducing the need for high-emission peaking plants in some cases. As customers reduce their peak usage, SO_2 reductions can be

[4] *Characterizing and Quantifying the Societal Benefits Attributable to Smart Metering Investments,* EPRI report, July 2008

achieved thereby eliminating pollution and helping to preserve our environment. Emissions are further reduced by the reduction in vehicle miles driven due to the elimination of manual meter reading and field visits for disconnect / reconnect, stopped meter, and outage investigations.

5.4.5. PEV

Only the benefits to society of AMI for the additional PEV ownership attributable to AMI were quantified. However, there are still several benefits from AMI that arise from those customers who would have purchased PEVs in the absence of AMI. By incentivizing these PEV owners to charge their vehicles during off-peak periods, AMI will reduce the amount of generation, transmission and distribution capacity needed by Ameren. Furthermore, as battery technology continues to evolve and mature, many believe that the PEVs can be utilized at certain times to provide energy back into the electric grid. AMI's net metering capabilities will be needed to measure the flow of energy in both directions. This is referred to as net metering to determine when the consumer is using power versus supplying. This can potentially be a very valuable resource in integrating more renewable generation resources into the grid.

5.4.6. Distributed Generation

Today, two meters are utilized at a residential level for distributed generation to measure when energy is being consumed from the grid versus when energy is being put out on the grid. With the new AMI meters, one single meter can be utilized in these situations. Net Metering with AMI meters records when consumers are using power versus supplying it. This reduces the costs for both the utility and the customer. Furthermore, with this added net metering functionality, utilities can ubiquitously offer customers new programs for renewable integration without having to add or change equipment. For example, utilities can offer programs around roof-top solar or solar hot water heaters.

5.4.7. Variable Generation

AMI allows for dynamic prices that reflect shifting supply conditions. In doing so, AMI creates an additional tool in managing this variable generation - customer demand response. For example, a smart-charging PEV can help balance the grid at night by charging when the wind gusts and putting additional electricity back on the grid when it does not.

5.4.8. New Services

AMI is a foundational infrastructure that may allow for services that expand into the home for smart appliances. Whirlpool and GE are among some of the leading brands working to integrate smart appliances with AMI. Whirlpool received $19 million in U.S. Department of Energy stimulus funding to support the manufacturing and commercialization of smart appliances that would communicate with AMI over the home area network (HAN). Ameren Illinois intends to purchase AMI meters that are capable of implementing the industry-embraced standard called Smart Energy Profile that governs how third parties interact with the metered information.

Furthermore, utilities can enable programs with customers to reduce load and will now have the capability of monitoring individual customer actions, such as verification that requested load reduction actually takes place

5.4.9. Customer Convenience

With the rollout of AMI, utilities will be able to provide better customer service, especially around customer-directed shut-off and reconnection dates. These improvements in service represent a non-monetary value to the customer, but they generally result in increased levels of customer satisfaction.

Also, for those customers with indoor meters, utilities will no longer have to make arrangements to get access to the building or home to read the meters.

6. Ameren Illinois AMI Cost / Benefit Analysis

For the purposes of comparing the benefits against the costs for the AMI program, Ameren Illinois has developed a robust approach that uses several different evaluation methodologies, including:

- Calculation of Terminal Value
- Payback period
- NPV analysis
- Total Resource Cost (TRC) analysis

The timeframe of the primary business case is 20 years for both benefits and costs, which aligns with the estimated useful life for the AMI-related investments.

Terminal value (continuation of benefits and costs beyond 20 years) was also included to reflect the useful life of AMI infrastructure remaining after the 20-year period (due to the staggered rollout schedule). In fact, approximately 38% of the installed meters in 2032 will still have at least 5 years of useful life remaining after the 20 year investment evaluation ends.

The cost/benefit analysis is taken from the customer perspective, with costs and benefits modeled as revenue requirement adjustments.

In general, costs are estimated and attributed to the year in which the cost is incurred. Benefits are attributed to the year in which they will be realized, which generally trails the occurrence of the related cost by one year to three years (e.g. customer benefits will be realized the year following the installation of the AMI meters for that portion of the customers).

Included in this analysis are all the benefits and costs across the categories in sections 3 and 4, summarized in Table 17:

Table 17: Cash-Basis Benefit & Cost Summary ($ in millions, over 20 years, non-discounted)

Key Cost / Benefit Drivers	Total
Benefits	
Utility O&M Benefits	$528
Utility Capital Benefits	$53
Customer/Societal Benefits	$695
Total (nominal)	**$1,277**
Costs	
AMI Meter & Communications Infrastructure	($129)
IT Systems & Integration	($294)
AMI Operations	($69)
Project Management & Associated Costs	($16)
Manual Methods to Meet Performance Metrics	($5)
Demand Response/Energy Efficiency Program	($53)
Total (nominal)	**($566)**
Terminal Value in Year 2032	**$243**

From a customer perspective, the impacts of the benefits and costs will take the form of changes to rates and direct customer benefits. Changes to rates are driven by O&M, depreciation, tax and revenue-requirement changes. The following table summarizes the customer benefits.

Table 18: Customer Impact Summary Table ($ in millions, over 20 years, non-discounted)

Net Customer Impact	TOTAL
O&M Expenses Net Change	$234
Depreciation Net Change (including stranded investment in existing meters)	($229)
Taxes Net Change	($32)
Return Requirements Net Change	($71)
Direct Customer Benefits	$938
Total (nominal)	**$840**

6.1. Calculation of Terminal Value

As Ameren Illinois is planning on an 8 year rollout of AMI meters across 62% of its customers, it is estimating an overall useful life of more than 20 years for the entire AMI system. While it is common practice for AMI business cases to have a 20-year timeframe, Ameren Illinois feels it is prudent to include an estimate of the business case beyond the 20-year window. As stated previously, in 2032 (the last year of the 20-year business case timeframe) approximately 38% of the installed meters will still have a remaining useful life of at least 5 years. It is assumed that the AMI system will still be at critical mass and operating until the number of active meters with remaining depreciable life dips below 100,000.

To capture the business case impacts of the remaining useful life of the AMI-related assets beyond the 20-year business case timeframe, a terminal value analysis was used. This involves using benefit and costs from the final years of the NPV analysis and projecting the future years based on that.

Several key steps are involved in the Terminal Value analysis:

1. Determine when there is no longer critical mass of active meters with remaining depreciable life (at least 100,000 active meters) – 2038 is the last year of critical mass in the base scenario
2. Identify the average fixed annual costs for operating and maintaining the AMI system – $14 million was calculated by averaging the AMI-related O&M expense for 2028 through 2032
3. Identify the average variable annual net benefit per meter (total benefits - variable costs) – $121.66 was calculated by averaging the net benefit for 2028 through 2032. This value is reduced to a 50% level on a straight-line basis during the 15 years of the TV analysis.
4. Calculate the net impact by year for each year remaining on useful life of meters up to the point where there is not critical mass of the AMI system – declining from approx. 822,000 meters in 2033 to approx. 179,000 meters in 2038)
5. Calculate the NPV of these net impacts using the customer-relevant discount rate of 3.62% (20-year Treasury Rate) to get the Terminal Value in 2032
6. Discount the 2032 Terminal Value to 2013 using the same discount rate

This results in a terminal value in 2032 of $243 million. By discounting this back to 2013, the terminal value yields an additional present value $119 million:

Table 19: Terminal value result ($ in millions)

Result	Total
NPV of Terminal Value in 2032	$243
NPV of Terminal Value in 2013	$119

6.2. Payback Period

The first business case methodology used by Ameren Illinois is the payback period analysis. This involves calculating when the cumulative customer benefits equals and begins to exceed the cumulative customer cost stream. This is useful in understanding to what extent the realization of the benefits lag the incurrence of the costs.

Below is a summary of the benefit & cost cash flows along with the cumulative cash flow:

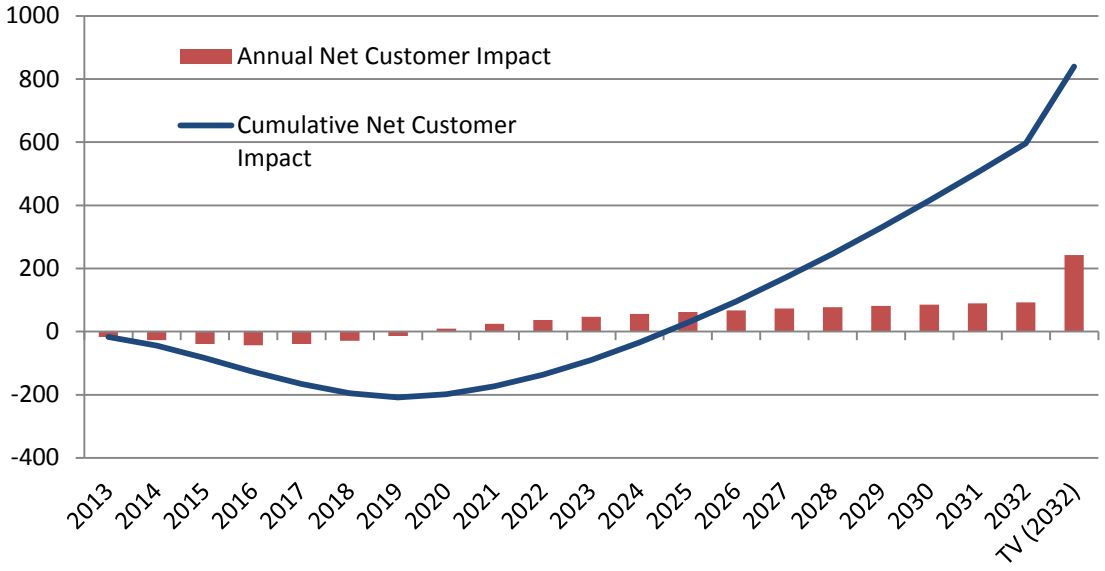
Table 20: Annual & Cumulative Cost / Benefit Cash Flow (in $ millions, non-discounted)

Year	Annual Net Customer Impact	Cumulative Net Customer Impact
2013	(17)	(17)
2014	(27)	(44)
2015	(39)	(84)
2016	(43)	(127)
2017	(39)	(166)
2018	(29)	(195)
2019	(13)	(208)
2020	10	(198)
2021	25	(173)
2022	37	(137)
2023	47	(90)
2024	56	(34)
2025	63	29
2026	67	96
2027	74	170
2028	78	247
2029	82	329
2030	86	415
2031	90	504
2032	93	597
Terminal Value (2032)	243	840

As can be seen in the table above, the payback period for the AMI business case is 13 years. In other words, the cumulative benefits will begin to exceed the cumulative costs in 2025. This payback period is reasonable, especially given the following factors:

- The bulk of the capital investment is in the first six years of the project duration
- The need to maintain multiple meter reading capabilities (processes & technologies) during the rollout period (manual read, AMR, and AMI during first seven years; AMR and AMI during the remaining years)
- The rollout of the meters is over an 8 year period, with 62% of the meters deployed by 2019

Figure 3: Payback Summary ($ millions)



6.3. Net Present Value

The second methodology used to evaluate the AMI business case is a Net Present Value (NPV) analysis. In this analysis, the annual costs and benefits cash flows of the AMI program are discounted by a customer-relevant discount rate. Here, the 20-year Treasury Bill rate of 3.62% is used. This results in an estimate of the economic value of the investment.

In this analysis, any NPV of greater than zero signifies an investment that earns a positive financial return after accounting for the time-value of money.

Below is a summary of the discounted net benefit/cost per year:

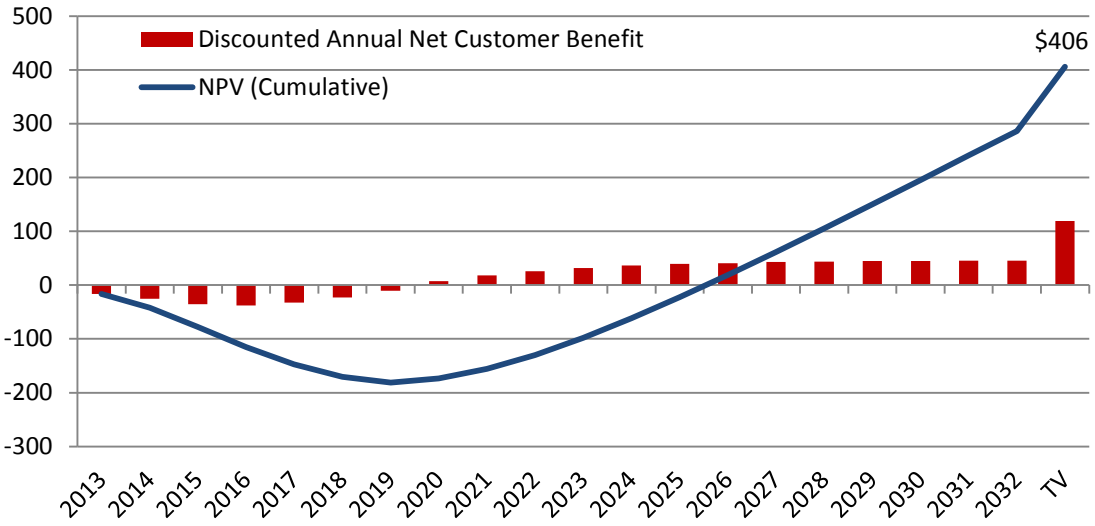
Table 21: Annual Discounted Net Customer Benefit (in $ millions, discounted)

Year	Net Customer Benefit
2013	(17)
2014	(25)
2015	(36)
2016	(38)
2017	(32)
2018	(23)
2019	(10)
2020	7

Year	Net Customer Benefit
2021	18
2022	26
2023	32
2024	36
2025	40
2026	41
2027	43
2028	44
2029	45
2030	45
2031	46
2032	46
TV (Terminal Value)	119
TOTAL (NPV)	406

As seen above, the NPV for the AMI business case is $406 million.

Figure 4: NPV Summary ($ millions)



6.4. Total Resource Costs (TRC)

Ameren Illinois also used a Total Resource Costs (TRC) analysis, which is a comparison of the total costs of the project (from both the utility and customer perspective) with the total benefits of the project (again, from both the utility and customer perspective).

Similar to the NPV analysis, both the benefits and costs are discounted to a net present value using a customer-relevant discount rate. Again, the 20-year Treasury Rate of 3.62% is used. The TRC is then calculated as ratio of the present value of benefits to the present value of costs.

For the purposes of this analysis, several simplifying assumptions were used in calculating the TRC. Specifically, Ameren Illinois used the net O&M and capital impacts as inputs into this analysis. Ameren Illinois considered net impacts that are negative as costs and net impacts that are positive as benefits. For example, net O&M is negative in the period of 2013-2017, so those were considered as costs for the TRC analysis. The positive net O&M values in years 2018-2032 were considered as benefits. Terminal value was included as a net benefit in the Gross Resource Benefits.

The result of the TRC analysis is a TRC of 1.87, which is summarized in Table 22.

Table 22: Total Resource Costs Analysis Summary ($ in millions, over 20 years)

Category	TOTAL
Gross Resource Benefits (nominal)	$1,469
PV of Gross Resource Benefits	$871
Gross Resource Costs (nominal)	$629
PV of Gross Resource Costs	$466
Total Resource Costs (ratio of PV of Gross Resource Benefits to PV of Gross Resource Costs)	**1.87**

7. Sensitivity Analysis

Ameren Illinois acknowledges that despite a meticulous and data-driven approach to conducting the cost / benefit analysis, the longer-term nature of the business case implies inherent uncertainties in the estimates of several AMI cost and benefit drivers. Ameren Illinois has thus conducted sensitivity analysis to identify the impact of changes to certain drivers on the base case.

7.1. Approach and Assumptions

Outlined in Table 23 is a summary of all the cost and benefit drivers that were subjected to sensitivity analysis. The table also highlights the range of values that each sensitivity parameters was subjected to, the resulting NPV, and the change in NPV from the base case.

Table 23: Sensitivity Analysis Variables, Assumptions, and Impact on NPV

Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
AMI Implementation Period	62% Electric Standalone Implementation over 8 years	62% Electric Standalone Implementation over 10 years	Ameren Illinois' cost/benefit analysis is prepared for an Electric Standalone implementation over 8 years. For the purpose of sensitivity analysis, Ameren Illinois assumed an Electric Standalone AMI implementation over 10 years.	$393 million
AMI Deployment Area	62% Electric Standalone Implementation over 8 years	100% Electric Standalone Implementation over 15 years	Ameren Illinois' cost/benefit analysis is prepared for an Electric Standalone implementation over 8 years. For the purpose of sensitivity analysis, Ameren Illinois assumed an Electric Standalone AMI implementation over 15 years.	$711 million

Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
O&M Benefits	$557 million	-30% to +15%[5]	Ameren Illinois' projected O&M benefits are driven by a data-focused and rigorous approach to estimations around cost reductions and loss prevention in numerous areas such as meter reading, field & meter services, UFE, billing and customer management etc. However, despite the analytical approach, unforeseen circumstances may cause the projected O&M benefits to vary. In order to calculate a range for the O&M benefits, Ameren Illinois assumes a 30% decrease and a 15% increase in O&M benefits over the 20-year business case time horizon.	[$287 - $466] million
O&M Costs	$236 million	-15% to +30%[5]	Ameren Illinois' projected O&M costs are based on a comprehensive assessment of the various drivers and associated yearly costs to operate and maintain the AMI infrastructure. However, due to the long-term nature of the AMI deployment, certain costs such as those to operate and maintain the AMI Communications Network as well as IT-related labor software maintenance costs may vary. Thus, Ameren Illinois assumes a 30% increase and a 15% decrease in O&M costs for purposes of sensitivity analysis	[$337 - $440] million

[5] Based on the Association for the Advancement of Cost Engineering (AACE) *Cost Estimate Classification System*, using Class 3 estimate and Expected Accuracy Range of 3 (i.e. 3x multiplier of +10%/-5% for costs). Benefits use the same ranges with inverse values.

Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
Capital Costs	$314 million	-15% to +30%[5]	Ameren Illinois' projected capital costs for meters and communications network hardware are based on average pricing obtained in response to RFIs. Capital costs for IT systems and labor, and management labor, while highly data driven and based on estimates from internal and external experts, contain a level of uncertainty given the long-term nature and scale of AMI deployment. Ameren Illinois thus assumes a 30% increase and a 15% decrease in capital costs for the purposes of sensitivity analysis	[$336 - $442] million
CIM Benefits ($ per KWH Recovery)	10.29 cents / KWH	5.3 cents / KWH	In the base case, Ameren Illinois assumes that it will be able to bill for and thereby recover the full 10.29 cents / KWH for consumption on inactive meters once AMI is implemented For purposes of sensitivity analysis, Ameren Illinois assumes that even if there is no tenant to bill for the entire lost energy consumption, it could still save energy supply cost of 5.3 cents / KWH	$400 million
Uncollectible Benefits	$3.75 million per year after 10 years of AMI rollout	-30% to +15%[5]	For the base case, Ameren Illinois assumes that at 62% AMI rollout, it will be able to reduce uncollectible electric expense by approximately 20% ($3.75 million per year). Since the ability to reduce bad debt expense depends on a multitude of factors including recovery rate after disconnect and increase in recoverable amount through revised collection process, Ameren Illinois estimates a 30% decrease ($2.6 million per year at 62% rollout) and a 15% increase ($4.3 million per year at 62% rollout) in uncollectible benefits for the purposes of sensitivity analysis	[$393 - $413] million

Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
Customer Opt-Out	0%	0.5% - 2.5%	The base case presented in this document assumes that 100% of the customers will participate in Ameren Illinois' AMI plan. However, Ameren Illinois is conducting sensitivity analysis to determine the impact of 0.5% and 2.5% customer opt-out. The effect of the customer opt-out is modeled assuming the additional costs of a one-time meter change and system set-up fee, a monthly off-cycle read fee, and the loss of potential AMI related benefits. If a Customer opt-out option is determined as necessary, it is recommended for fairness to those customers who do not opt-out, the associated costs and reduction in potential AMI related benefits should be borne by those customers that are allowed to Opt-out.	[$372 - $402] million
Add Premise Visit Costs for Non-Pay Disconnects	No premise visits needed for disconnect of non-paying customers	Premise visits needed for disconnect of non-paying customers	In the base case, Ameren Illinois assumes that it will realize cost savings from automating manual disconnects for non-paying customers, plus benefits from reduced uncollectibles. For purposes of this sensitivity analysis, Ameren Illinois assumes that it will still realize these benefits. However an additional cost will be incurred for a properly skilled workforce to continue to make premise visits prior to disconnecting for non-pay.	$396 million
Energy Theft Reduction	0.25%	0.1% - 0.4%	The model estimates that AMI will help Ameren Illinois save 0.25% of revenue associated with each AMI meter that is currently lost due to energy theft. Ameren Illinois has observed that other utilities have seen energy theft reduction benefits in the range of 0.5% - 1% of revenue. For the purposes of the sensitivity analysis, Ameren Illinois estimates (again, conservatively) that between 0.1% and 0.4% of revenue associated with each AMI meter can be saved as a result of AMI.	[$390 - $422] million

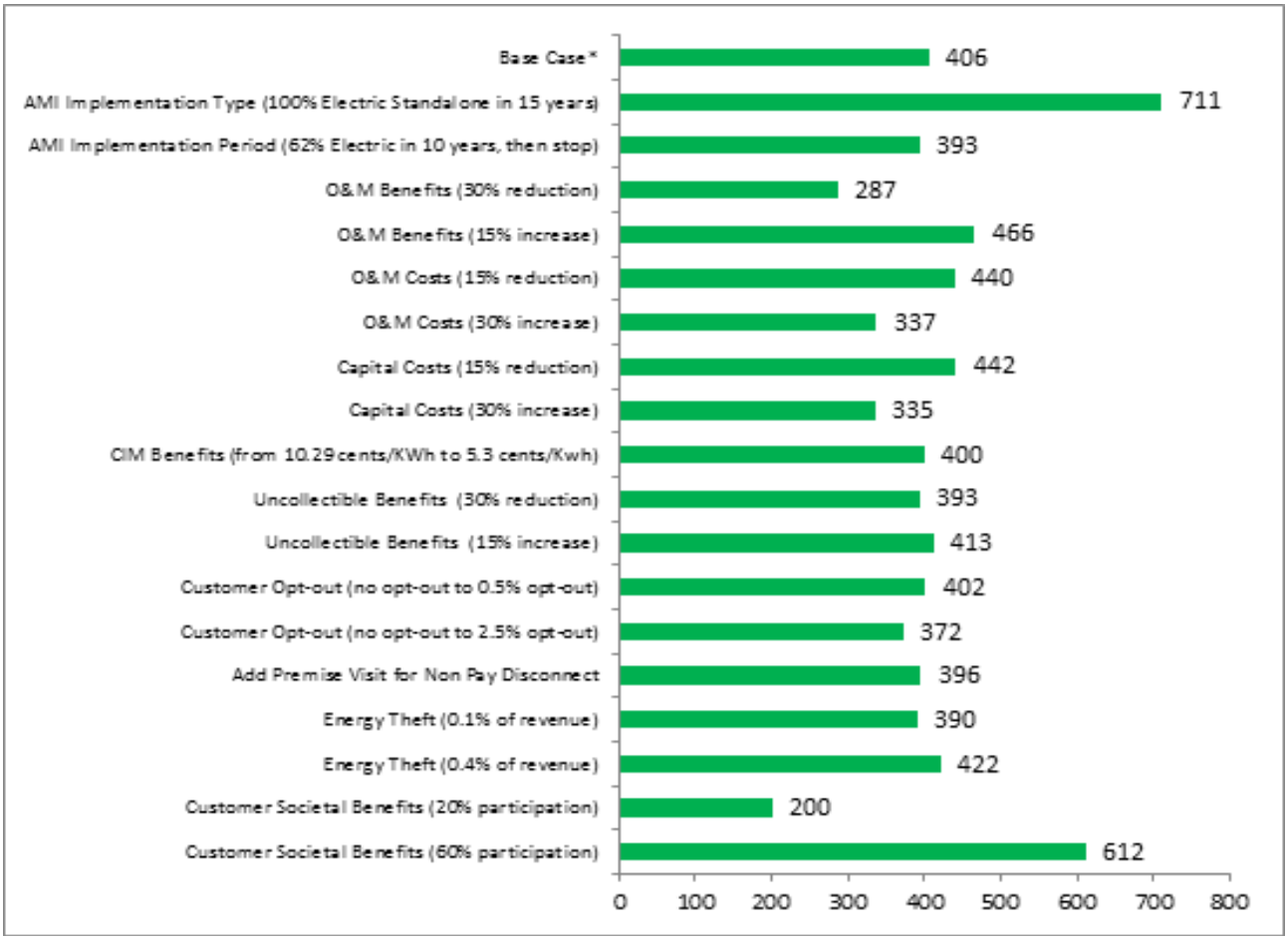
Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
Customer/ Societal (DR,EE,& PEV)	40% participation rate	20% - 60% participation rates	Ameren Illinois has conducted analysis around Customer/Societal benefits and assumed 40% participation rate by customers in the base case. For the purposes of the sensitivity analysis, Ameren Illinois has taken 50% to 150% of this value.	[$200 - $612] million

7.2. Sensitivity Analysis Results

Figure 5 shown below graphically illustrates how Ameren Illinois' AMI NPV changes with respect to changes in the cost and benefit assumptions for the major drivers of the AMI business case.

It can be noted that the business case NPV remains positive despite conservative assumptions around certain cost and benefit drivers.

Figure 5: Sensitivity Analysis Results – Revised NPVs ($ millions)



8. Appendix

8.1. General Assumptions

- The business case assumes 62% deployment of AMI electric meters over a period of 8 years
- The model analysis period is 20 years ending in 2032, with AMI meter deployment commencing in year 2014
- Meter depreciation time (useful life) period used in the model is 20 years
- Meter growth rate is estimated at 0.25% annually
- Salvage cost per meter is assumed to be $1.00
- The following escalation rates over the 20-year business case time horizon are assumed:
  - General: 2.5%
  - Labor: 3.0%
  - Transportation: 4.75%
  - Meters: 0.0%
- Financial Assumptions
  - AIC composite tax rate of 41.2% is used to calculate Net Customer Impact
  - Discount Rate of 3.62% (20-year Treasury Rate) is used to calculate NPV
- Assumes full implementation of AMI technologies to all electric customers
  - No customer opt-out is assumed for the cost / benefit analysis
  - No premise visit is required for disconnects for non-pay

8.2. Cost Summary by Year

(in $ millions)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capital Items - Summary																				
Meters																				
AMI Meters	$ -	$ 4,066,064	$ 14,935,866	$15,010,520	$15,085,454	$15,160,668	$15,236,165	$ 198,737	$ 199,234	$ 199,732	$ 200,231	$ 200,732	$ 201,234	$ 201,737	$ 202,241	$ 202,747	$ 203,253	$ 203,762	$ 204,271	$ 204,782
AMI Meter Installation	-	1,233,059	4,665,274	4,829,250	4,998,959	5,174,600	5,356,379	71,963	74,308	76,728	79,228	81,808	84,473	87,225	90,066	93,000	96,030	99,158	102,388	105,723
AMI Communications Network Hardware & Installation	-	1,825,250	3,461,525	3,528,003	3,595,942	3,620,824	3,618,427	29,294	29,672	30,056	30,447	30,845	31,250	31,662	32,082	32,509	32,944	33,386	33,837	34,296
Information Technology (Applications and Operations)																				
Hardware	1,881,557	42,171	87,986	154,627	211,376	249,902	2,706,755	204,087	133,802	87,986	-	-	3,051,933	-	-	-	-	-	3,010,283	-
Software	859,040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Labor	24,154,257	22,247,223	22,834,895	3,644,156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Security and Planning	256,317	420,762	-	143,987	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project Management	7,753,566	5,324,115	5,479,186	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operations	1,608,872	1,500,382	1,544,082	264,630	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asset Management	-	1,092,727	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Program Management																				
Program Management	5,206,300	4,165,040	3,123,780	780,945	780,945	780,945	780,945	-	-	-	-	-	-	-	-	-	-	-	-	-
AMI Operations																				
Metering Operations	1,027,346	1,058,166	1,089,911	1,122,608	1,156,287	1,190,975	1,226,704	-	-	-	-	-	-	-	-	-	-	-	-	-
Communications	690,420	888,916	1,355,064	1,357,994	1,313,256	1,352,653	1,393,233	-	-	-	-	-	-	-	-	-	-	-	-	-
Gas Module Replacements	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Capital	$43,437,673	$43,863,875	$ 58,577,570	$30,836,721	$27,142,217	$27,530,568	$30,318,609	$ 504,081	$ 437,015	$ 394,503	$ 309,906	$ 313,385	$ 3,368,890	$ 320,624	$ 324,389	$ 328,256	$ 332,227	$ 336,306	$ 3,350,779	$ 344,801
O&M Items - Summary																				
Meter Reading Costs																				
Manual Disconnect & Read to Meet Metrics	568,284	681,826	675,698	538,622	479,389	476,989	346,277	275,776	353,779	539,068	-	-	-	-	-	-	-	-	-	-
AMI Communications Network	-	94,551	322,718	597,250	889,332	1,199,817	1,529,594	1,728,798	1,784,050	1,841,074	1,899,929	1,960,673	2,023,367	2,088,074	2,154,859	2,223,789	2,294,932	2,368,360	2,444,147	2,522,369
Opt Out Exchange Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disconnect for Non-Pay Premise Visit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accelerated Depreciation for Existing Meters	-	318,275	1,352,137	2,208,809	2,898,054	3,178,750	3,102,888	1,364,978	(62,099)	(1,205,892)	(2,118,401)	(2,755,967)	(2,306,681)	(1,893,790)	(1,517,830)	(1,164,791)	(867,577)	(606,757)	(381,573)	(190,829)
Information Technology (Applications and Operations)																				
Hardware	220,790	417,120	489,880	521,760	567,000	621,200	356,880	699,880	728,160	743,920	743,920	743,920	356,880	743,920	743,920	743,920	743,920	743,920	356,880	743,920
Software	5,760,936	2,006,130	2,496,365	2,615,037	2,697,788	2,905,653	3,026,450	2,541,332	2,569,066	2,597,597	2,626,948	2,657,145	2,688,211	2,720,173	2,753,058	2,786,894	2,821,709	2,857,531	2,894,392	2,948,338
Labor	-	701,610	1,666,323	4,221,859	3,459,533	3,552,199	3,644,865	3,737,531	3,830,197	3,922,863	4,015,529	4,108,195	4,197,367	4,293,527	4,386,193	4,478,859	4,571,525	4,664,191	4,756,857	4,849,523
Security and Planning	-	-	103,000	103,000	266,699	271,084	275,469	279,854	284,238	291,713	299,281	306,944	314,705	322,568	330,535	338,609	346,794	355,093	363,510	372,047
Project Management	1,654,740	1,704,382	877,012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operations	-	-	795,938	1,183,565	1,473,293	1,512,756	1,552,219	1,591,682	1,631,146	1,670,609	1,710,072	1,749,535	1,788,998	1,828,462	1,867,925	1,907,388	1,946,851	1,986,314	2,025,778	2,065,241
Asset Management	-	-	3,659	17,614	32,475	48,285	65,090	82,939	85,641	88,431	91,311	94,286	97,357	100,528	103,803	107,185	110,676	114,281	118,004	121,848
Management and Other Costs																				
Metering Operations	206,876	213,082	219,474	226,058	232,840	239,825	247,020	489,290	503,969	519,088	534,660	550,700	567,221	584,238	601,765	619,818	638,412	657,565	677,292	697,610
Customer Education - Deployment & Initial Functionality	525,313	1,704,108	1,992,178	2,052,058	2,113,737	1,582,924	1,633,504	4,970	5,107	5,248	5,393	5,541	5,694	5,851	6,012	6,178	6,348	6,523	6,703	6,888
Demand Response	-	-	-	92,411	137,215	238,008	369,938	423,614	338,171	301,167	228,466	151,670	91,388	51,724	28,251	15,193	8,178	4,476	5,053	491
Energy Efficiency	-	-	-	92,411	137,215	238,008	369,938	423,614	338,171	301,167	228,466	151,670	91,388	51,724	28,251	15,193	8,178	4,476	5,053	491
Electric Vehicle Enhancement	-	-	-	482,679	706,842	1,207,981	1,847,644	2,079,014	1,783,097	1,586,243	1,201,454	795,689	477,570	268,519	144,998	76,448	39,754	20,512	23,755	-
Customer Technology Interface & Support	-	-	-	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	200,000	200,000	200,000	200,000	200,000	200,000
Customer Education - Dynamic Pricing & Technology	-	-	551,906	565,704	579,847	594,343	609,201	624,431	640,042	656,043	672,444	689,256	706,487	724,149	742,253	760,809	779,829	799,325	819,308	839,791
Total O&M	$ 8,936,938	$ 7,841,084	$ 11,546,289	$17,518,838	$18,671,258	$19,867,822	$20,976,978	$18,347,704	$ 16,812,735	$ 15,858,338	$ 14,139,474	$ 13,209,258	$ 13,099,953	$ 13,889,667	$ 12,573,993	$ 13,115,492	$ 13,649,530	$ 14,175,813	$ 14,315,159	$ 15,177,730
Grand Total O&M / Capital	52,374,611	51,704,958	70,123,859	48,355,558	45,813,476	47,398,390	51,295,587	18,851,785	17,249,750	16,252,841	14,449,380	13,522,643	16,468,844	14,210,291	12,898,382	13,443,748	13,981,757	14,512,118	17,665,937	15,522,531

8.3. Benefits Summary by Year

(in $ millions)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
O&M Items - Summary																				
Meter Reading																				
Reduction in Manual Meter Reading Expenses	$ -	$ -	$ 1,516,398	$ 3,589,502	$ 5,796,060	$ 7,718,730	$ 9,057,114	$ 9,352,149	$ 9,656,795	$ 9,971,365	$ 10,296,183	$ 10,631,581	$ 10,977,904	$ 11,335,510	$ 11,704,764	$ 12,086,047	$ 12,479,750	$ 12,886,277	$ 13,306,048	$ 13,739,492
Reduction in AMR Meter Reading Expenses	-	-	-	-	-	412,947	1,929,049	3,090,705	3,175,893	3,263,428	3,353,377	3,445,804	3,540,779	3,638,372	3,738,654	3,841,701	3,947,588	4,056,393	4,168,198	4,283,084
Reduction in Manual and AMR Meter IT Costs	-	-	8,436	40,408	74,136	109,692	133,640	137,324	141,109	144,998	148,995	153,101	157,321	161,657	166,113	170,692	175,396	180,231	185,198	190,303
Reduction in On-Cycle Meter Reading Vehicle	-	-	70,631	170,034	279,222	378,164	430,801	452,393	475,066	498,876	523,879	550,135	577,707	606,661	637,066	668,995	702,524	737,734	774,708	813,535
Field & Meter Services																				
Reduction in Manual Disconnect / Reconnect Meters	-	-	213,815	1,372,263	2,529,966	3,761,638	5,070,868	6,461,403	6,671,883	6,889,220	7,113,636	7,345,363	7,584,638	7,831,708	8,086,826	8,350,254	8,622,263	8,903,134	9,193,153	9,492,620
Reduction in Manual Off-Cycle / Special Meter Reads	-	-	560,489	1,326,748	2,142,333	2,852,988	3,195,806	3,299,909	3,407,403	3,518,400	3,633,011	3,751,357	3,873,557	3,999,738	4,130,030	4,264,566	4,403,484	4,546,927	4,695,043	4,847,984
Reduction in Nuisance Stopped Meter Orders	-	-	6,012	57,880	106,711	158,662	213,883	272,535	281,413	290,580	300,045	309,819	319,911	330,333	341,093	352,204	363,677	375,524	387,757	400,388
Reduction in Field Services Vehicle Expense	-	-	28,079	161,794	303,157	458,282	605,167	728,174	764,669	802,994	843,239	885,501	929,881	976,485	1,025,426	1,076,819	1,130,788	1,187,461	1,246,975	1,309,472
Reduction in Customer Equipment Problem Outage Field Trips	-	-	-	4,509	8,314	12,361	16,663	21,232	21,924	22,638	23,376	24,137	24,923	25,735	26,574	27,439	28,333	29,256	30,209	31,193
Reduction in "OK on Arrival" Outage Field Trips	-	-	-	126,892	233,944	347,835	468,899	597,480	616,943	637,040	657,792	679,219	701,345	724,191	747,782	772,141	797,293	823,265	850,083	877,774
Salvage Value of Replaced Meters	-	40,714	149,553	150,301	151,051	151,804	152,560	1,990	1,995	2,000	2,005	2,010	2,015	2,020	2,025	2,030	2,035	2,040	2,045	2,050
Reduction in Unacounted for Energy																				
Theft / Tamper Detection & Reduction	-	-	51,894	491,527	891,597	1,304,292	1,729,911	2,168,762	2,203,318	2,238,425	2,274,091	2,310,325	2,347,136	2,384,535	2,422,528	2,461,128	2,500,342	2,540,181	2,580,655	2,621,774
Faster Identification of Dead Meters	-	-	7,491	70,950	128,698	188,268	249,704	313,051	318,039	323,106	328,254	333,484	338,798	344,196	349,681	355,252	360,913	366,663	372,505	378,441
Billing Fuction																				
Reduction in Call Volume	-	-	31,785	152,955	281,915	419,043	561,735	708,468	731,393	755,062	779,497	804,723	830,767	857,654	885,413	914,071	943,657	974,202	1,005,736	1,038,292
Reduction in Float Between Meter Read & Customer Billing	-	-	1,253	5,934	10,764	15,746	20,885	26,183	26,600	27,024	27,454	27,892	28,336	28,788	29,246	29,712	30,186	30,667	31,155	31,652
Reduction in Call Center Back Office Management	-	-	3,659	17,614	32,475	48,285	65,090	82,939	85,641	88,431	91,311	94,286	97,357	100,528	103,803	107,185	110,676	114,281	118,004	121,848
Information Technology (Applications and Operations)																				
Information Technology	-	37,422	203,769	210,668	217,813	225,214	232,880	240,821	283,699	262,147	271,209	280,602	290,340	300,437	310,905	321,760	333,018	344,693	401,682	366,487
Miscellaneous																				
Distribution System Management	-	-	-	12,855	23,586	34,898	46,815	59,363	61,000	62,681	64,409	66,184	68,008	69,882	71,809	73,788	75,822	77,911	80,059	82,266
Outage Management	-	-	-	171,970	317,052	471,403	635,474	809,733	836,110	863,347	891,470	920,510	950,496	981,458	1,013,429	1,046,441	1,080,529	1,115,727	1,152,072	1,189,601
Asset Management	-	-	13,946	67,128	123,760	184,010	248,055	316,076	326,373	337,004	347,982	359,318	371,022	383,108	395,588	408,474	421,780	435,520	449,707	464,356
Total O&M Impacts	$ -	$ 78,136	$ 2,867,210	$ 8,201,933	$ 13,652,553	$ 19,254,261	$ 25,065,000	$ 29,140,691	$ 30,087,266	$ 30,998,764	$ 31,971,214	$ 32,975,351	$ 34,012,244	$ 35,082,997	$ 36,188,754	$ 37,330,698	$ 38,510,054	$ 39,728,089	$ 41,030,994	$ 42,282,614
Capital Items - Summary																				
Distribution System Management	-	-	-	259,477	383,927	515,039	653,088	671,089	689,586	708,592	728,123	748,192	768,814	790,004	811,779	834,153	857,145	880,770	905,046	929,991
Outage Management	-	-	-	206,439	380,600	565,889	762,845	972,033	1,003,697	1,036,392	1,070,153	1,105,013	1,141,009	1,178,177	1,216,556	1,256,186	1,297,106	1,339,359	1,382,989	1,428,040
Asset Management	-	-	20,369	98,047	180,765	268,767	362,311	461,664	476,702	492,231	508,265	524,822	541,918	559,571	577,799	596,621	616,056	636,124	656,846	678,243
Avoided Meter Purchases	-	84,375	372,654	597,426	831,752	945,957	860,616	773,559	792,399	811,837	831,892	852,584	873,935	895,965	918,696	942,152	966,356	991,332	1,017,105	1,043,701
Total Capital Impacts	$ -	$ 84,375	$ 393,024	$ 1,161,390	$ 1,777,043	$ 2,295,652	$ 2,638,860	$ 2,878,344	$ 2,962,384	$ 3,049,052	$ 3,138,433	$ 3,230,611	$ 3,325,676	$ 3,423,717	$ 3,524,831	$ 3,629,112	$ 3,736,662	$ 3,847,584	$ 3,961,985	$ 4,079,975
Customer Benefits																				
Consumption on Inactive Meters	365,973	450,213	538,437	630,791	727,426	828,498	934,169	1,044,606	1,159,981	1,280,472	756,194	777,037	798,454	820,461	843,075	866,312	890,190	914,726	939,938	965,845
Uncollectible Expense	-	-	140,634	1,001,051	1,608,576	2,248,830	2,923,156	3,317,942	3,409,393	3,656,593	3,599,926	3,699,149	3,801,107	3,905,875	4,013,531	4,124,153	4,237,825	4,354,631	4,474,655	4,597,988
Demand Response	-	-	-	244,502	854,987	2,385,513	5,701,934	11,036,302	15,690,540	20,489,697	24,802,353	28,319,728	31,067,343	33,231,018	35,011,404	36,564,771	37,996,735	39,373,859	40,837,689	42,167,714
Energy Efficiency	-	-	-	25,665	73,632	187,669	399,794	690,786	988,023	1,317,516	1,616,042	1,828,815	1,940,223	2,014,902	2,061,021	2,089,771	2,108,360	2,121,140	2,135,921	2,141,248
Electric Vehicle Enhancement	-	-	-	189,047	532,663	1,244,966	2,583,462	4,445,113	6,248,437	8,047,096	9,606,174	10,835,029	11,764,385	12,436,569	12,940,110	13,337,049	13,668,613	13,960,307	14,288,056	14,549,000
Carbon Reduction	-	-	-	-	-	-	-	-	-	-	-	-	963,990	1,115,512	1,257,885	1,393,714	1,524,932	1,653,902	1,713,977	1,768,298
Value of Reduced Outage Duration	-	-	-	348,415	639,236	945,824	1,268,827	1,608,916	1,653,262	1,698,830	1,745,654	1,793,769	1,843,209	1,894,013	1,946,217	1,999,859	2,054,980	2,111,621	2,169,822	2,229,628
Total Customer Impacts	$ 365,973	$ 450,213	$ 679,071	$ 2,439,471	$ 4,436,519	$ 7,841,300	$ 13,811,342	$ 22,143,667	$ 29,149,637	$ 36,490,205	$ 42,126,343	$ 47,253,527	$ 52,178,711	$ 55,418,348	$ 58,073,242	$ 60,375,630	$ 62,481,637	$ 64,490,185	$ 66,560,058	$ 68,419,721
	$ 365,973	$ 612,724	$ 3,939,305	$ 11,802,793	$ 19,866,116	$ 29,391,213	$ 41,515,201	$ 54,162,702	$ 62,199,287	$ 70,538,021	$ 77,235,990	$ 83,459,489	$ 89,516,630	$ 93,925,063	$ 97,786,827	$ 101,335,440	$ 104,728,353	$ 108,065,858	$ 111,553,038	$ 114,782,310

8.4. Net Customer Impacts Summary by Year

(in $ millions)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
O&M Benefits																				
Total AMI O&M Savings	$ -	$ 78,136	$ 2,867,210	$ 8,201,933	$ 13,652,553	$ 19,254,261	$ 25,065,000	$ 29,140,691	$ 30,087,266	$ 30,998,764	##########	$ 32,975,351	$ 34,012,244	$ 35,082,997	$ 36,188,754	$ 37,330,698	$ 38,510,054	$ 39,728,089	$ 41,030,994	$ 42,282,614
O&M Expenses																				
Meters and Modules	(568,284)	(1,094,653)	(2,350,553)	(3,344,681)	(4,266,775)	(4,855,556)	(4,978,759)	(3,369,553)	(2,075,729)	(1,174,250)	218,472	795,293	283,314	(194,284)	(637,029)	(1,058,998)	(1,427,355)	(1,761,603)	(2,062,574)	(2,331,540)
Information Technology Applications and Operations	(7,636,466)	(4,829,242)	(6,432,177)	(8,662,836)	(8,496,788)	(8,911,177)	(8,920,973)	(8,933,217)	(9,128,448)	(9,315,133)	(9,487,061)	(9,660,024)	(9,443,519)	(10,009,178)	(10,185,434)	(10,362,855)	(10,541,475)	(10,721,332)	(10,515,421)	(11,100,918)
Management and Other Costs	(732,188)	(1,917,190)	(2,763,559)	(5,511,321)	(5,907,695)	(6,101,089)	(7,077,246)	(6,044,933)	(5,608,558)	(5,368,955)	(4,870,885)	(4,344,527)	(3,939,749)	(3,686,205)	(1,751,530)	(1,693,639)	(1,680,700)	(1,692,878)	(1,737,164)	(1,745,272)
Total AMI O&M Expense	(8,936,938)	(7,841,084)	(11,546,289)	(17,518,838)	(18,671,258)	(19,867,822)	(20,976,978)	(18,347,704)	(16,812,735)	(15,858,338)	(14,139,474)	(13,209,258)	(13,099,953)	(13,889,667)	(12,573,993)	(13,115,492)	(13,649,530)	(14,175,813)	(14,315,159)	(15,177,730)
Depreciation / Taxes and Total Costs to Customers																				
Net Change in Operation and Maintenance Expense	(8,936,938)	(7,762,948)	(8,679,079)	(9,316,905)	(5,018,705)	(613,560)	4,088,021	10,792,987	13,274,531	15,140,426	17,831,739	19,766,093	20,912,290	21,193,330	23,614,761	24,215,206	24,860,523	25,552,276	26,715,835	27,104,884
Net Change in Book Depreciation	(4,130,574)	(11,980,097)	(19,762,818)	(25,077,992)	(27,178,691)	(24,899,016)	(19,268,370)	(13,315,943)	(9,221,179)	(8,331,502)	(7,675,608)	(7,118,832)	(6,964,758)	(7,018,911)	(6,899,256)	(6,722,897)	(6,270,933)	(5,848,970)	(5,633,802)	(5,449,283)
Net Change in Income Taxes	(1,398,025)	(2,429,835)	(3,600,023)	(3,538,546)	(3,384,904)	(3,400,129)	(3,682,857)	(3,017,922)	(2,507,060)	(2,069,032)	(1,671,429)	(1,298,682)	(1,048,449)	(697,738)	(374,150)	(76,775)	191,760	439,925	581,357	836,164
Net Change in Return Requirement	(3,138,182)	(5,454,310)	(8,081,061)	(7,943,062)	(7,598,178)	(7,632,355)	(8,267,001)	(6,774,405)	(5,627,660)	(4,644,408)	(3,751,899)	(2,915,184)	(2,353,480)	(1,566,231)	(839,864)	(172,339)	430,448	987,511	1,304,986	1,876,959
Total Cost to Customers	(17,603,719)	(27,627,190)	(40,122,980)	(45,876,505)	(43,180,477)	(36,545,060)	(27,130,207)	(12,315,282)	(4,081,368)	95,485	4,732,803	8,433,395	10,545,604	11,910,450	15,501,492	17,243,196	19,211,798	21,130,743	22,968,375	24,368,725
Customer Benefits																				
Consumption on Inactive Meters	365,973	450,213	538,437	630,791	727,426	828,498	934,169	1,044,606	1,159,981	1,280,472	756,194	777,037	798,454	820,461	843,075	866,312	890,190	914,726	939,938	965,845
Uncollectible Expense	-	-	140,634	1,001,051	1,608,576	2,248,830	2,923,156	3,317,942	3,409,393	3,656,593	3,599,926	3,699,149	3,801,107	3,905,875	4,013,531	4,124,153	4,237,825	4,354,631	4,474,655	4,597,988
Demand Response	-	-	-	244,502	854,987	2,385,513	5,701,934	11,036,302	15,690,540	20,489,697	24,802,353	28,319,728	31,067,343	33,231,018	35,011,404	36,564,771	37,996,735	39,373,859	40,837,689	42,167,714
Energy Efficiency	-	-	-	25,665	73,632	187,669	399,794	690,786	988,023	1,317,516	1,616,042	1,828,815	1,940,223	2,014,902	2,061,021	2,089,771	2,108,360	2,121,140	2,135,921	2,141,248
Electric Vehicle Enhancement	-	-	-	189,047	532,663	1,244,966	2,583,462	4,445,113	6,248,437	8,047,096	9,606,174	10,835,029	11,764,385	12,436,569	12,940,110	13,337,049	13,668,613	13,960,307	14,288,056	14,549,000
Carbon Reduction	-	-	-	-	-	-	-	-	-	-	-	-	963,990	1,115,512	1,257,885	1,393,714	1,524,932	1,653,902	1,713,977	1,768,298
Customer Outage Benefits	-	-	-	348,415	639,236	945,824	1,268,827	1,608,916	1,653,262	1,698,830	1,745,654	1,793,769	1,843,209	1,894,013	1,946,217	1,999,859	2,054,980	2,111,621	2,169,822	2,229,628
Terminal Value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	242,961,816
Total Customer Benefits	365,973	450,213	679,071	2,439,471	4,436,519	7,841,300	13,811,342	22,143,667	29,149,637	36,490,205	42,126,343	47,253,527	52,178,711	55,418,348	58,073,242	60,375,630	62,481,637	64,490,185	66,560,058	311,381,538
Net Customer Impact (Change in Customer Costs)	$ (17,237,746)	$ (27,176,976)	$ (39,443,909)	$ (43,437,035)	$ (38,743,958)	$ (28,703,761)	$ (13,318,866)	$ 9,828,385	$ 25,068,269	$ 36,585,689	##########	$ 55,686,922	$ 62,724,314	$ 67,328,799	$ 73,574,734	$ 77,618,826	$ 81,693,436	$ 85,620,927	$ 89,528,433	$ 335,750,262
Cumulative Net Customer Impact	(17,237,746)	(44,414,722)	(83,858,631)	(127,295,665)	(166,039,624)	(194,743,384)	(208,062,250)	(198,233,865)	(173,165,597)	(136,579,907)	(89,720,761)	(34,033,839)	28,690,475	96,019,274	169,594,008	247,212,833	328,906,269	414,527,196	504,055,630	839,805,892
Net Present Value of Net Customer Impact	$ 405,918,613																			

8.5. Total Resource Costs (TRC) Analysis by Year

(in $ millions)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Customer Benefits (non-discounted)	365,973	528,349	3,546,281	10,641,403	18,089,073	27,095,561	38,876,341	51,284,358	59,236,903	67,488,969	74,097,557	80,228,878	86,190,954	90,501,346	94,261,996	97,706,328	101,183,451	104,658,198	108,172,409	354,500,316
Total Customer Benefits (discounted)	353,187	492,078	3,187,443	9,230,486	15,142,527	21,889,539	30,309,605	38,586,574	43,013,032	47,293,005	50,110,002	52,360,967	54,286,900	55,010,400	55,294,612	55,312,754	55,280,058	55,180,886	55,041,255	174,078,392
NPV of Customer Benefits	871,453,705																			
Total Customer Costs (non-discounted)	(17,603,719)	(27,705,325)	(42,990,190)	(54,078,438)	(56,833,031)	(55,799,322)	(52,195,207)	(41,455,973)	(34,168,635)	(30,903,280)	(27,238,410)	(24,541,956)	(23,466,640)	(23,172,547)	(20,687,262)	(20,087,503)	(19,490,015)	(19,037,271)	(18,643,976)	(18,750,054)
Total Customer Costs (discounted)	(16,988,727)	(25,803,349)	(38,640,132)	(46,908,310)	(47,575,447)	(45,078,286)	(40,693,543)	(31,191,655)	(24,810,489)	(21,655,524)	(18,420,537)	(16,017,182)	(14,780,335)	(14,085,217)	(12,135,263)	(11,371,782)	(10,648,077)	(10,037,374)	(9,486,595)	(9,207,267)
NPV of Customer Costs	(465,535,092)																			
Total Resource Costs	1.87																			

8.6. Terminal Value Summary

(in $ millions)

	5 Year Average 2028 - 2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Number of Meters Installed	818,154	822,245	781,532	631,978	481,677	330,626	178,821	26,261	24,271	22,276	20,276	20,276	16,261	14,246	12,226	10,201
AMI System Still at Scale?		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No
(designates whether there are at least 100,000 meters installed)																
Total AMI O&M Annual Expense	(14,086,745)	(14,438,913)	(14,799,886)	(15,169,883)	(15,549,130)	(15,937,859)	(16,336,305)	-	-	-	-	-	-	-	-	-
Total Net Customer Impact (Change in Customer Costs)	85,450,013															
Total Net Customer Impact Without O&M Annual Expense	99,536,758															
Average Per Meter Net Customer Impact Without O&M Annual Expense	121.66	117.60	113.55	109.49	105.44	101.38	97.33	-	-	-	-	-	-	-	-	-
(assumes benefit declines 100% to 50% on straight-line basis)																
Calculated Net Customer Impact (Change in Customer Costs)		82,261,046	73,942,578	54,027,987	35,238,309	17,582,123	1,068,045	-	-	-	-	-	-	-	-	-
PV of Terminal Value in 2032	242,961,816															
NPV of Terminal Value in 2013	119,307,094															

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Advanced Metering Infrastructure (AMI)

Cost / Benefit Analysis

~~March 30, 2012~~

Table of Contents

1. Executive Summary

This document expands on the AMI Plan for Ameren Illinois Corporation (Ameren Illinois) to implement cost-beneficial advanced metering infrastructure (AMI). These pages describe how Ameren Illinois evaluated and prioritized technologies to create value for our customers, our company, and the State of Illinois via AMI.

To develop the cost/benefit analysis for the AMI deployment, Ameren Illinois used the guiding principles outlined in Section 16-108.6(a) of the Illinois Public Utilities Act which provides as follows:

> "Cost beneficial" means a determination that the benefits of a participating utility's Smart Grid AMI Deployment Plan exceed the costs of the Smart Grid AMI Deployment plan as initially filed with the Commission or as subsequently modified by the modified by the Commission. This standard is met if the present value of the total benefits of the Smart Grid AMI Deployment Plan exceeds the present value of the total costs of the Smart Grid AMI Deployment Plan. The total cost shall include all utility costs reasonably associated with the Smart Grid AMI Deployment Plan. The total benefits shall include the sum of avoided electricity costs, including avoided utility operational costs, avoided consumer power, capacity, and energy costs, and avoided societal costs associated with the production and consumption of electricity, as well as other societal benefits, including the greater integration of renewable and distributed power sources, reductions in the emissions of harmful pollutants and associated avoided health-related costs, other benefits associated with energy efficiency measures, demand-response activities, and the enabling of greater penetration of alternative fuel vehicles."

As support for the AMI Plan, Ameren Illinois ~~has~~ developed a cost/benefit analysis of implementing AMI within the Ameren Illinois service territory~~.~~ and submitted this filing to the Illinois Commerce Commission (ICC) on March 30, 2012. In conducting this evaluation, the project team worked closely with business managers over an 8-month period (August 2011 – March 2012) to refine the scope of the AMI investment, research industry AMI initiatives, develop operational data and projections, identify and resolve key business case formation questions, and construct the AMI business case. ~~Figure 1 summarizes the specific benefits of this implementation.~~

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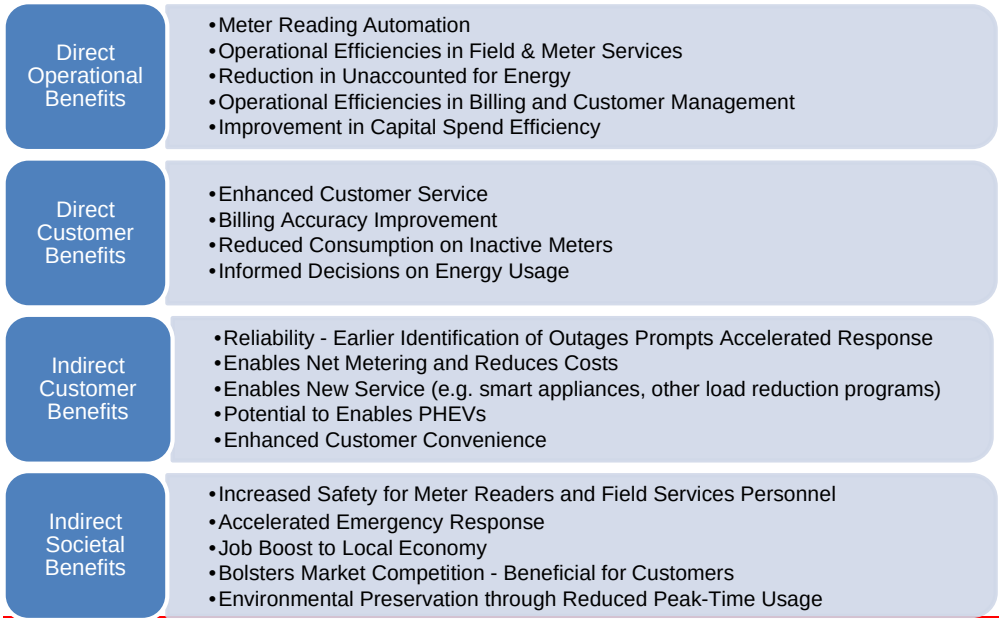
During June 2012, after the ruling of the ICC on the initial filing, Ameren Illinois fine-tuned the cost/benefit analysis, refocusing the base case to an 8 year, 62%, electric-only AMI meter deployment plan, adding additional benefits in key areas, and refining cost estimates.

Figure 1 summarizes the specific benefits of this implementation.

Figure 1: AMI Implementation Benefits Summary



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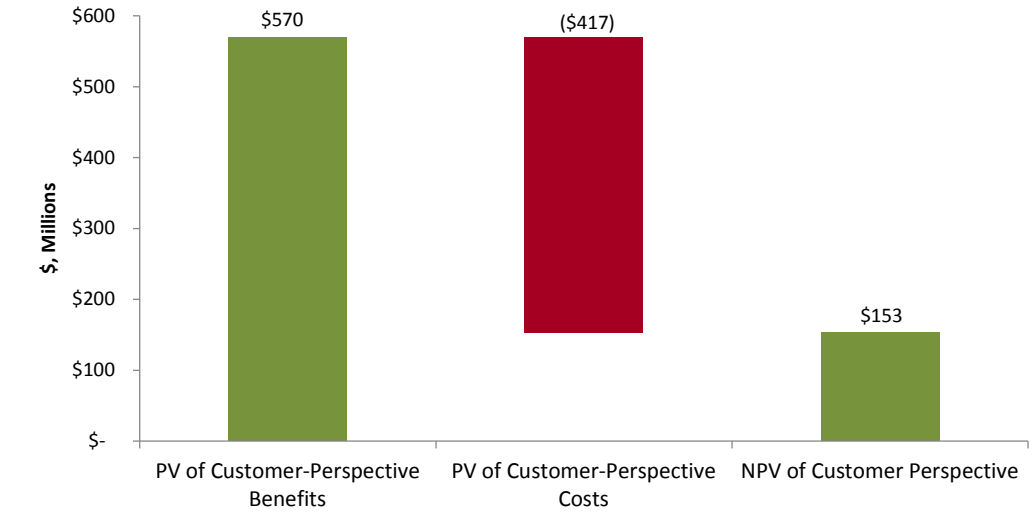
The overall results of the evaluation are positive. Taking into account all costs and benefits, and assuming adjustments to customer rates, the Net Present Value (NPV) is $~~153~~406 million over the 20-year cost/benefit evaluation term (including terminal value) as seen in Figure 2. This is the value of the AMI program to Ameren Illinois customers. This does not include ~~other indirect societal~~the Additional Customer/Societal benefits of AMI outlined subsequently in this evaluation.

Figure 2: NPV of Ameren Illinois AMI Business Case Summary



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On the cost side, Ameren Illinois will incur new costs for AMI meters and communications infrastructure, IT systems, implementation services, and on-going operational expenses. During the 20-year evaluation period, Ameren Illinois expects the Present Value total cost of ownership to reach $~~417~~466 million.

The Present Value of benefits over the 20-year evaluation period ~~are~~is estimated at $~~570~~872 million, and ~~exceed~~exceeds the Present Value of costs by $~~153~~406 million. Benefits result from meter reading automation, reduction in unaccounted for energy, operational efficiencies in field & meter services, billing and customer management, improved ~~capital~~distribution system spend efficiency, as well as customer benefits such as reduction in consumption on inactive meters and ~~demand response~~Demand Response benefits and the others listed in Figure 1.

2. Ameren Illinois AMI Context and Background

As a utility serving the State of Illinois, Ameren Illinois is a leading energy provider that serves more than 1,200 communities. Every day, Ameren Illinois delivers energy to 1.2 million electric and 840,000 natural gas customers in central and southern Illinois. Ameren Illinois is also an early adopter of Automated Meter Reading (AMR), having introduced this technology to parts of the utility's 43,700-mile service territory in ~~-~~1998. Upon completion of the automated meter deployment in 2010, Ameren Illinois had installed 678,000 electric and 476,000 ~~-~~gas one-way-communication-enabled AMR meters covering more than half of its gas and electric customers.

Taking advantage of advancements in metering technology and leveraging two-way radio frequency (RF) networks~~ that were installed during the AMR project~~, Ameren Illinois strives to promote "green" technologies and ensure high-quality service in a cost-effective manner through the AMI initiative. As such, and in order to fulfill the provisions required as part of the AMI Plan, our AMI cost/benefit analysis evaluates a 20-year investment and outlines the determination that the benefits exceed all costs reasonably associated with this initiative.

A number of key assumptions were formed as Ameren Illinois analyzed variables and scenarios to identify impacts to customers from implementing AMI in its service territory. Additional detailed assumptions are contained in the Appendix.

2.1. Key Deployment Assumptions

2.1.1. Ownership/Operation of AMI Network

Ameren Illinois plans to own and operate the AMI communications network ~~-~~(as opposed to paying an outside vendor to own and/or operate the network).

2.1.2. ~~Coincident Installation of~~ Standalone Electric Base Case

~~2.1.2.~~ For the purposes of this business case, it is assumed that AMI is implemented for electric customers only, and ~~Gas Meters~~

all costs associated with the electric AMI rollout are included. Ameren Illinois understands that there will be costs and benefits to customers from implementing AMI within its gas service territory in conjunction with AMI electric. ~~Ameren Illinois plans on a simultaneous rollout of gas AMI along with the electric AMI rollout, provided the Company has (i) a clear path to full and complete cost recovery (i.e. return of and on investments and operating costs) and (ii) a strong and healthy financial position to provide the financing needed to install and maintain the infrastructure. This business case is an electric-only view of costs and benefits, but includes electric allocations for infrastructure shared across both electric and gas.~~

2.1.3. Implementation Schedule

The timing of meter deployment drives different costs and benefits for Ameren Illinois customers. As per the statutory requirement, Ameren Illinois is committed to serving 62% of its electric customers with AMI ~~in 10~~within 8 years~~, and plans to continue rollout of AMI meters to 100% of its customer base over 15 years, provided the Company has (i) a clear path to full and complete cost recovery (i.e. return of and on investments and operating costs) and (ii) a strong and healthy financial position to provide~~. To meet the ~~financing needed to install and maintain the infrastructure. Furthermore~~62% requirement, Ameren Illinois ~~assumes a roll-out to its~~ has chosen

an 8 year deployment plan that ends in 2019. Deployment will start in and include all of the non-AMR ~~served~~ operating centers ~~first, followed by~~ which will include 46% of the 62% requirement. The remaining 16% will be in the AMR operating centers~~.~~ by 2019.

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~~2.2.~~2.1.4. Vendor Pricing

Ameren Illinois issued ~~two~~ Requests for Information (RFI) and Requests for Proposal (RFP) to a base of AMI and Meter Data Management (MDM) ~~System~~ vendors ~~asking for indicative~~. The RFP responses included detailed pricing on ~~an~~ the AMI Network deployment~~,~~ and MDM implementation. ~~This~~ Since specific vendors have not been selected at this time, this cost/benefit analysis uses an average pricing methodology ~~across~~from the responses to the ~~RFI~~RFP.

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~~2.3.~~2.1.5. Business Case Approach

During the period from August 2011 through ~~March~~June 2012, the Ameren Illinois AMI project team has worked closely with:

- Ameren Illinois business executives to understand the strategic imperatives and refine the scope of the AMI investment
- Ameren Illinois function leaders to project operational activities and associated costs and benefits
- External vendors and industry experts to obtain metering, communication and IT infrastructure cost estimates, research industry AMI initiatives, identify and resolve key business case formation questions, and construct the AMI business case

~~2.3.1.~~2.1.6. Cost Estimates Approach

The Ameren Illinois AMI project team worked through ~~a~~ formal RFI ~~process~~and RFP processes to engage with multiple external ~~metering~~ vendors to obtain cost estimates for AMI field hardware (meters and communications infrastructure), installation, software purchase, and administration costs. The team also engaged with both external IT vendors and internal IT and Corporate Planning teams to assess the costs associated with hardware procurement, software purchasing and licensing, IT development and integration, and overall support and maintenance of the IT systems and infrastructure needed during AMI deployment. Moreover, department leaders helped identify resource requirements and cost estimates for program management and associated operational activities such as customer education, customer management, and technical support.

With respect to meter depreciation, Ameren Illinois has reviewed some of the largest AMI deployment plans in the United States, such as those by Duke Energy, Southern California Edison, DTE, and PG&E to base its AMI deployment on a useful life of 20 years for the AMI meter. As with any complex system, individual components may fail early or last longer than the overall useful life. The AMI meter's useful life does not depend on when the first component fails or how long the last meter-module functions. Instead, its life depends on the system as a whole operating correctly and reliably**.** Moreover, Southern California Edison conducted product testing that concluded that the meter useful life would be 20 years or more[1].

~~2.3.2.~~2.1.7. Benefit Estimates Approach

[1] SCE Cost Benefit Analysis, Vol 3., December 21, 2006

The Ameren Illinois AMI project team relied heavily on both internal and external AMI and metering experts to identify AMI benefit areas and detail cost reductions and loss prevention associated with each benefit area commensurate with the meter deployment schedule. While direct operational and customer benefits in several areas such as meter reading, field and meter services, unaccounted for energy, billing accuracy, consumption on inactive meters, Demand Response, Energy Efficiency, and ~~demand response~~PEV were quantified, numerous ~~indirect~~additional customer and societal benefits have also been evaluated and included in the business case.

~~2.3.3.~~2.1.8. Cost/Benefit Analysis Approach

A rigorous approach to the AMI cost / benefit analysis was conducted by using several different evaluation methodologies, including Payback Period, Net Present Value (NPV) analysis, as well as Total Resource Cost (TRC) analysis. The time horizon used for the business case was 20 years. However, a terminal value was also calculated to take into account the costs and benefits associated with the un-depreciated AMI infrastructure remaining beyond the 20 year period. The cost benefit analysis is taken from the customer perspective, with costs and benefits modeled as revenue requirement adjustments.

As such, the discount rate that is used for the NPV analysis should also reflect a customer-perspective discount rate. This is consistent with the Illinois Statewide Smart Grid Collaborative (ISSGC) recommendation of "using an appropriate discount rate." Therefore, a customer-relevant discount rate was used for this analysis as the 20-Year Treasury Bill rate (3.62% currently). This approach is consistent with the ComEd AMI pilot evaluation and the Ameren ~~Illinois~~Illinois Cost/Benefit Analysis timeframe.

~~2.4.~~2.2. Alignment with Illinois Statewide Smart Grid Collaborative Recommendations

Ameren Illinois adhered to the guidelines of the Illinois Statewide Smart Grid Collaborative (ISSGC) when developing the cost and benefit estimates. The table below summarizes how Ameren Illinois complied with these guidelines.

Table 1: Alignment with ISSGC Cost-Benefit Filing Requirements

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
1. Provide cost-benefit analyses of the investment(s), including a Total Resource Cost test:	The analysis should include any factor (i.e., cost or benefit) that meets the following criteria: • They can be expected to have a meaningful economic impact on the utility's investment decision or are relevant to the Commission's approval decisions • They can be reasonably and transparently quantified and monetized • They are relevant to the analysis, specifically including the costs of achieving claimed benefits.	✓ Requirement Met
	Costs and benefits should only be counted once; there can be no double-counting of benefits.	✓ Requirement Met

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
	All costs and benefits used in the analysis should be incremental to the investment when compared with a baseline or "business as usual" scenario. The baseline scenario should reflect the related costs or benefits that would be anticipated if the investment were not made.	✓ Requirement Met (Costs and benefits were analyzed to ensure only incremental values were used)
	The cost-benefit analysis should recognize as a separate line item any stranded costs that would result from the smart grid investment.	✓ Requirement Met
1. Provide cost-benefit analyses of the investment(s), including a Total Resource Cost test: (cont'd)	The utility should be required to present multiple views, or perspectives, as part of their cost-benefit analysis to be filed with the Commission. • A Total Resource Cost perspective for investments should be presented by the utilities – both with societal costs and benefits and without societal costs and benefits • Other perspectives that should be presented include a Ratepayer Impact view (depicting how rates would be impacted) and a Customer/Participant view (depicting the impacts of customer-specific costs and benefits) As appropriate to each test, the cost-benefit analysis should separately identify: 1) Those costs and benefits that will be directly incurred or realized by ratepayers through the traditional ratemaking structure 2) Those costs that can be expected to be incurred by non-utility parties 3) Those benefits that will flow, if at all, through the wholesale price of energy or other markets 4) Those benefits associated with broader societal objectives or results that are not necessarily reflected in regulated customer rates.	✓ Requirement Met (Both a customer/ratepayer impact and Total Resource Cost views are included in this analysis)
	Cost-benefit analysis may bundle or package together investments in several applications if those applications are needed to function together or provide otherwise unachievable synergies, or if they are reliant on a common infrastructure investment. To the extent that it is feasible to separate underlying platforms from individual applications, smart grid applications contained within a package should still be subject to individual cost-benefit analysis based on their stand-alone incremental costs and benefits.	✓ Requirement Met (Ameren Illinois views the AMI investment as a comprehensive capability that is considered as a whole)

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
	Cost-benefit analysis should provide a calculation of a payback period based on the present value of the annual cash flows of the smart grid investment or package	✓ Requirement Met
	Potential non-regulated, third party, or incidental revenue from smart grid infrastructure investments should be reflected in the cost-benefit analysis.	N/A (This analysis does not include non-regulated or third-party/incidental revenue)
2. Provide documentation supporting the cost-benefit analyses	Documentation of key assumptions underlying the analyses, particularly of those factors that may have a high degree of variability and/or uncertainty	✓ Requirement Met
	Discussion of the uncertainties associated with estimates of costs and benefits over the term of the payback period	✓ Requirement Met (Included a sensitivity analysis – see section 7)
	Discussion of the potential change in benefits and costs that may occur over time assuming various implementation schedules	✓ Requirement Met ~~(Considered both a 10-year and 15-year rollout schedule as later described in the sensitivity analysis)~~
	Identification and discussion of other investments or approaches (if any) that reasonably might achieve similar or better results	✓ Requirement Met (Multiple AMI and MDM vendor solutions will be evaluated as a part of the project to identify the best-fit solution)
	Documentation of the discount rates used in the analyses and a discussion of the rationale for their use	✓ Requirement Met

Requirement (from ISSGC report)	Sub-Requirement (from ISSGC report)	Ameren Illinois Business Case Alignment
	Documentation of a sensitivity analysis of the projected costs and benefits of the investment to variables and assumptions. While reasonable discretion should be provided in terms of the variables and assumptions to be included, the sensitivity analysis should: – Identify the key variables from the cost-benefit analysis that merit sensitivity analysis. The degree of participation, assumed behavioral impacts, and persistence of customer behavior changes should be among the variables included in sensitivity analyses. Other candidates for inclusion are variables (such as emission costs and reliability) that have a wide range of potential values and/or are more subjective in nature. – Produce cost-benefit results using alternate values for the variables in order to demonstrate the sensitivity/impact various scenarios might have on the economic profile of the smart grid investments.	✓ Requirement Met
	Discussion of the rationale behind the packaging or bundling of applications in the analyses	✓ Requirement Met (Ameren Illinois views the AMI investment as a comprehensive capability that is considered as a whole)
	Documentation of the investment's useful life and the basis for its determination	✓ Requirement Met
2. Provide documentation supporting the cost-benefit analyses (cont'd)	Documentation of the length of time over which reasonable customer benefits can be reliably estimated	✓ Requirement Met
	Documentation of assumptions regarding any environmental benefits incorporated in the analysis (e.g., emissions reduced, values of emissions/allowances)	~~N/A~~ ~~(This analysis does not include any quantified environmental benefits)~~✓ Requirement Met
	Discussion of the methodology and assumptions used in deriving the estimated benefits from load shape changes. This discussion should describe the model(s) used, model inputs and outputs, model logic (at a high level), scenarios performed, and how model results are to be interpreted.	✓ Requirement Met (This analysis includes a high-level summary of the ~~demand response~~Demand Response benefit methodology, which is based on peak load shifting)

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3. Ameren Illinois AMI Program Costs

Ameren Illinois has conducted detailed cost assessments to determine the life cycle cost of AMI ownership, as well as the capital and operations and maintenance (O&M) costs associated with AMI deployment. AMI deployment is expected to be completed within ~~15~~8 years. Operations of the AMI infrastructure will commence prior to the AMI system installation and continue through the timeframe of the business case.

The major cost components of the AMI deployment are summarized in the table below.

Table 2: Key Cost Components (in $ millions, over 20 years)

Key Cost Components	Capital	O&M	Total
AMI Meter and Communications Infrastructure and Implementation	$~~195~~ 129	$~~4~~ 0	$~~199~~ 129
IT Systems and Integration	$~~91~~ 111	$~~160~~ 183	$~~251~~ 294
Project Management	$~~7~~ 16	$0	$~~7~~ 16
AMI Operations	$~~21~~ 16	$~~72~~ 53	$~~93~~ 69
Manual Methods to Meet Performance Metrics	$0	$5	$5
Demand Response/Energy Efficiency Program Costs	$0	$53	$53
TOTAL	**$~~314~~ 272**	**$~~236~~294**	**$~~550~~566**

3.1. AMI Metering Equipment and Communications Infrastructure Implementation

This cost category includes the capital costs associated with the installation, configuration and customization of the AMI metering and communications systems. This also includes O&M costs associated with accelerated depreciation of existing meters.

Ameren Illinois estimates that the 20-year capital costs incurred as a result of full AMI deployment within ~~15~~8 years will be approximately $~~195~~129 million. Below is a summary of the main components of these costs.

Table 3: AMI Metering Equipment & Communications Infrastructure Cost Breakout (in $ millions, over 20 years)

AMI Metering Equipment and Communications Infrastructure Cost Drivers	Capital	O&M	Total
AMI Meters	$~~133~~82	$0	$~~133~~82
AMI Meter Installation	$~~29~~27	$0	$~~29~~27
AMI Communications Network Hardware & Installation	$~~33~~20	$0	$~~33~~20
Accelerated Depreciation for Existing Meters	$0	$~~4~~0	$~~4~~0
TOTAL	**$~~195~~129**	$~~4~~0	**$~~199~~129**

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Capital costs include costs of AMI meters and communications, as well as installation and project management costs. The cost estimates were derived from the AMI vendor ~~RFI~~RFI's and RFP's that ~~was~~were issued in ~~September~~ 2011~~.~~ and 2012.

AMI meter costs include the costs for the physical AMI meter for single-phase and three-phase meters having embedded two-way RF radio communicators. All self-contained meters that are 200 Amps or less will also have an internal switch for remote connect / disconnect applications. This cost is based on a 62% deployment, an annual ~~meter~~ growth rate of 0.25% ~~to determine the total number (approximately 1.3 million)~~on an initial meter count of 780,419 AMI meters ~~that will be deployed after 100% roll-out within 15~~, over 8 years.

Installation of meters is a complex activity involving pre-installation preparations and field deployment. During pre-installation, facilities are prepared for AMI meter processing, field surveys are completed, and plans are developed for meter deployment. Network preparation, including right of ways and interagency permissions are obtained. During field deployment, the meters are actually installed at the customer premises (and the existing meter is taken out of service).

Meter deployment is major activity. It involves setting up cross-dock facilities as ~~a~~ logistical hubs for meter deployment. Meters are checked for performance and accuracy before deployment. The workforce is trained and deployed to cross-dock facilities. Deployment is scheduled based on route plan. Meters are installed, and clean-up is performed to complete the installation process. Tests of meter communication and data accuracy are performed as a part of commissioning.

The AMI communications network hardware and installation phase involves the physical roll-out of the communications infrastructure (collection points, wide area network (WAN) hardware) in the field and within Ameren Illinois facilities (head-end communications equipment). First, the communications network is installed in each operating center area to provide immediate visibility to the meters that will be installed. Network communication implementation includes field survey, installation of communication equipment and testing of communication equipment. It is estimated that there will be ~~1,252~~a number of collection points across the Ameren~~-~~ Illinois service territory.

The final cost driver related to the AMI Metering Equipment implementation is the accelerated depreciation for the existing non-AMR meters and applicable AMR meters & infrastructure. Since the AMI meters will be rolled out to ~~all~~62% of customers over the ~~15~~8 year deployment period, all existing ~~meters (both~~ non-AMR ~~and~~meters as well as a small portion of AMR~~)~~ meters will be replaced during that timeframe. Many of these meters will still have a depreciable life remaining at the point they are replaced. Therefore, the costs for accelerating the remaining depreciation for these meters are included in this analysis, which is consistent with the guidelines recommended by the Illinois Statewide Smart Grid Collaborative.

The existing depreciation schedule calls for depreciation on existing meters (both AMR and non-AMR) to total $~~87~~85 million in ~~2012-~~2013-2032~~2031~~ and $~~4~~2 million in 2033~~2031~~ and beyond. The accelerated depreciation schedule for the existing meters based on AMI implementation totals $~~91~~87 million in ~~2012-2025.~~2013-2019. While the total depreciated is the same for the existing & accelerated schedules (including years after ~~2031~~2032), the difference between the existing & accelerated depreciation for each year is included in the cost estimates. The ~~total of the~~ accelerated depreciation ~~is $4M over the 20-year timeframe of this analysis~~of meters that will be replaced by AMI meters has a minimal overall impact.

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3.2. IT Systems and Integration

This cost category includes the ~~implementations~~implementation costs associated with the IT systems and integration hardware, software, development, security and project management, as well as the ongoing maintenance of these systems. Ameren Illinois estimates that the 20-year capital and O&M costs incurred as a result of ~~full~~62% AMI deployment within ~~15~~8 years will be approximately $~~251~~294 million.

Key components of AMI-related IT systems:

- AMI IT systems include head-end systems to communicate with the AMI network, capture meter data and send control commands to the meter.
- Head-end systems transfer data to a Meter Data Management System (MDMS) where ~~it's~~meter data is validated against acceptance rules to ensure data quality. Estimations are done for missing data and edits are made to some data elements.
- Storage systems are needed, as meter data increases exponentially over current needs, increasing the importance of systematic data management.
- Data will need to be shared by several systems, and it requires an integration platform to allow sharing of the information between various enterprise systems (e.g. providing data ~~of~~for various applications such as billing, customer service and customer analytics).
- Security of the AMI network, including planning and implementation of security architecture to protect customer and operational data, is required.

Table 4: IT Systems and Integration Cost Breakout (in $ millions, over 20 years)

IT Systems and Integration Cost Drivers	Capital	O&M	Total
Hardware	$~~18~~12	$~~9~~12	$~~27~~ 24
Software	$1	$~~59~~57	$~~60~~ 58
Labor	$~~56~~73	$~~57~~73	$~~113~~ 146
Security and planning	$1	$~~4~~5	$~~5~~ 6
Project Management	$~~12~~18	$4	$~~16~~ 22
Operations	$~~3~~5	$~~27~~30	$~~30~~ 35
Asset Management Planning Support	$1	$2	$3
TOTAL	**$~~91~~ 111**	**$~~160~~ 183**	**$~~251~~ 294**

Ameren Illinois estimates capital costs for IT systems and integration to be approximately $~~91~~111 million over 20 years.

Outlined below are further details on the key elements of Ameren Illinois' anticipated AMI IT infrastructure:

- Hardware
  - Servers for Enterprise Service Bus (ESB) ~~and Business Process Management (BPM)~~
  - Network Operations Hardware
- Software
  - AMI Head End
  - Application Servers & Database Servers
  - Meter Data Management System
  - Data Analytics Software
  - ESB Tools
- Labor
  - Key activities include:
    - AMI & MDMS Design and Implementation
    - MDMS Integration
    - AMI Integration
    - ESB Integration
    - Environment Set Up, Installs, etc.

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- Data Analytics Support

- Security and Planning
  - Costs have been estimated for the planning, designing, and building of security systems and protocols to securely transmit data within the network.
  - On-going IT system security administration will incur additional costs

- Project Management
  - Key activities include centralized training, personnel recruiting, employee communications, and miscellaneous start-up related activities
  - Vendor oversight of the Request for Proposals (RFP) process and contracts supervision will also bear additional costs
  - Other management overhead costs spanning two or more functional cost categories, such as project management and the administration of job skills training, are also included in this cost category

- Operations
  - Costs have been allocated for on-going application support, post production support / transition, upgrade, and maintenance for AMI-related IT systems

Both Ameren Illinois resources and contractor resources will be employed for support and maintenance of IT systems. Furthermore, fees will need to be paid to vendors for product support and servicing.

Asset Management Planning Support costs include the development of enhanced asset planning analysis tools and software to enable better forecasting and planning. Additionally, there is an on-going maintenance cost for the tools and software that will be developed.

3.3. Program Management

A long-term strategic initiative such as AMI deployment requires a substantial amount of resources for program delivery activities. Ameren Illinois estimates that $~~7~~16 million will be needed to fund program management activities.

Table 5: Program Management Cost Breakout (in $ millions, over 20 years)

Program Management Cost Drivers	Capital	O&M	TOTAL
Program Management	$~~7~~16	$0	$~~7~~16

Program Management activities include

- **Governance:** Oversight, program prioritization and approval, establishing program sponsorship and accountability,
- **Quality Management:** The development and management of standard processes and practices to manage quality across the program
- **Program Scheduling and Staffing**: The management of integrated timelines and dependencies; securing and allocating resources to satisfy demand in a timely manner
- **Issue and Risk Management:** A standard methodology and tool for reporting, prioritizing, and escalating issues to ensure timely resolution; the development and management of standard risk identification and response capabilities to manage risk across the program
- **Project Communications and Reporting**
- **Financial/Benefits Realization and Regulatory Management:** The management and production of financial planning and reporting; management of benefits realization and business cases to ensure

business benefits are measured and achieved; single point of contact to manage compliance with requirements of Commission

- **Change Control Process:** The management and prioritization of new projects or new requirements, including change orders
- **Release Management:** The management of an integrated release strategy to support organization-wide prioritization, dependencies and risk
- **Sourcing Strategy and Management:** Single point of contact to manage compliance with requirements of legal department
- **Vendor/Contract Management:** Integrated management of key vendors, including contractual, administrative and communication functions
- **Employee communications:** Managing communications with internal audiences, external audiences, and executives to ensure common messages, executive sponsorship and appropriate stakeholder involvement

The program management work will be performed by a combination of internal and external resources.

3.4. AMI Operations (Start-up and On-going)

This category of costs represents the costs of start-up and on-going operations for supporting AMI operational activities throughout the business case evaluation period of 20 years. As outlined in Table 6, AMI operational costs include costs for metering operations, communications operations and consumer education. The 20-year total cost in this area is $~~93~~69 million, of which $~~21~~16 million is capital and $~~72~~53 million is O&M.

Table 6: AMI Operations Cost Breakout (in $ millions, over 20 years)

AMI Operations Cost Drivers	Capital	O&M	TOTAL
Metering Operations	$~~21~~8	$~~5~~9	$~~26~~17
Communications Operations	$~~0~~8	$~~43~~32	$~~43~~40
Consumer Education	$0	$~~24~~12	$~~24~~12
TOTAL	**$~~21~~16**	**$~~72~~53**	**$~~93~~69**

3.4.1. Metering Operations

Metering operations includes all costs related to managing Ameren Illinois' AMI metering operations during implementation and on an on-going basis. Included in this are the following areas:

- **Meter Inventory Management:** Managing the inventory for ~~1.3 million~~780,419 meters over the ~~15~~8-year rollout
- **Meter Maintenance:** Performing routine maintenance and repairs to meters that fail
- **Meter Warehousing:** ~~Facilities~~Facility costs for housing the meter inventory, especially during the initial rollout
- **Meter Testing and Make-ready:** Initial testing of meters before installation to ensure the meters are fully operational
- **Meter Technical Support**: Diagnosing problems when meters experience issues
- **Meter Field Services:** Implementation-related service calls after AMI meters are installed

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3.4.2. Communications Operations

Communications operations include all aspects of maintaining and operating the AMI communications network. This includes WAN backhaul charges, as well as costs for maintaining the AMI communication networks to ensure availability for continuous AMI operation. Also included are rent/charges for using shared facilities in some places, such as communication ~~towers~~backhaul and ~~repeaters.~~repeater equipment. FTEs include network operations engineers, field / telecom operations technicians and supervisors, as well as NOC infrastructure specialists.

3.4.3. Consumer Education

~~Finally, the~~The success of AMI program is contingent on the ability of Ameren Illinois to communicate with customers, with a specific focus on educating them on the safety and capabilities of the AMI system. The focus is to enable the customer so that customer direct benefits are maximized. This also includes both broad public education and specific customer education on the positive impacts of AMI technology, implementation success stories, ~~and/or how AMI creates value in energy conservation~~how AMI creates value in energy conservation, and/or specific details on participation in Demand Response/Energy Efficiency programs. In addition, customer education efforts will include instruction on how to use customer self-service and web portal tools. Details on the customer education program can be found in the AMI Plan document.

3.5. Manual Methods to Meet Performance Metrics

This category of costs represents the costs of the manual methods required to supplement the AMI delivered benefits in order to meet Ameren Illinois' AMI-related performance metrics as established in Illinois Public Acts 97-616 and 97-646. Ameren Illinois estimates that, since the deployment of AMI meters won't begin until 2014 and will end in 2019, the AMI system won't be fully operational and deployed in time to meet the performance metrics, specifically in the areas of disconnects to reduce Consumption on Inactive Meters (CIM) and estimate bills. As outlined in Table 7, the 20-year total costs in this area is $5 million O&M, of which $4 million is related to the CIM metric and $1 million is related to the estimated bill metric.

Table 7: Manual Methods to Meet Performance Metrics Breakout (in $ millions, over 20 years)

Manual Methods to Meet Performance Metrics	Capital	O&M	Total
Disconnects to Meet CIM Metric	$0	$4	$4
Manual Meter Reads to Meet Estimated Bill Metric	$0	$1	$1
Disconnects to Meet Uncollectibles	$0	$0	$0
TOTAL	**$0**	**$5**	**$5**

3.5.1. Disconnects to Meet CIM Metric

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In ~~Ameren Illinois estimates that $2 million of annual customer education costs will be incurred in the first five years of the implementation, with $1 million in each remaining year of the meter rollout schedule.~~

~~Ameren Illinois AMI Direct~~ order to reduce consumption on inactive meters, Ameren Illinois estimates that additional physical disconnects will need to occur to prevent usage on accounts that have had their service stopped. The AMI system will ultimately provide the capability to remotely physically disconnect electrical service to customers that have stopped service on their account. Until the AMI system is fully deployed and operational, additional manual disconnects will need to occur to meet the performance targets. Ameren Illinois

estimates that an additional 4,800 manual disconnects on average will need to occur each year in the 2013-2022 timeframe, resulting in approximately $4M of additional costs.

3.5.2. Manual Meter Reads to Meet Estimated Bill Metric

In order to reduce estimated bills, Ameren Illinois estimates that additional meter reads will need to occur. The AMI system will ultimately provide the capability to remotely read a meter on demand to address situations where an estimated bill would normally be issued. Until the AMI system is fully deployed and operational, additional manual meter reads will need to occur to meet the performance targets.

3.5.3. Disconnects to Meet Uncollectibles

In order to reduce the amount of uncollectible revenue that is written off each year, Ameren Illinois estimates that additional physical disconnects will need to occur to prevent additional usage on accounts that are overdue. The AMI system will provide a remote disconnect capability that will address this need once the AMI system is fully implemented. Ameren Illinois estimates that additional manual physical disconnects will only need to occur to meet the performance metrics in 2022, so the there are minimal costs included in the cost / benefit analysis.

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4.3.6. Demand Response/Energy Efficiency Program ~~Benefits~~Costs

This category of costs represents the Demand Response and Energy Efficiency program costs to implement Demand Response and Energy Efficiency programs. Based on cost estimates developed by the Institute for Electric Efficiency for enabling Demand Response/Energy Efficiency technologies, detailed cost estimates were developed. The technologies are based on digital electronics whose costs will decline significantly over the next two decades, as typically happens when technological innovation within digital technologies achieves economies of scale. A decrease in cost over the first 10 years will be at a rate of 16% per year and then fall to a decrease of 8% per year over the last 10 years.

Table 8: Demand Response/Energy Efficiency Program Costs (in $ millions, over 20 years)

Demand Response/Energy Efficiency Program Costs	Capital	O&M	Total
Demand Response	$0	$3	$3
Energy Efficiency	$0	$2	$2
PEV Enablement	$0	$13	$13
Customer Technology Interface & Support	$0	$23	$23
Customer Education – Dynamic Pricing and Technology	$0	$12	$12
TOTAL	**$0**	**$53**	**$53**

3.6.1. Demand Response

Customers will have the choice to opt-in to a Peak Time Rebate (PTR) program, Critical Peak pricing rate, Direct Load Control program, or Time of Use program with the AMI program. Costs associated with this program include technology such as in-home displays, programmable control thermostats, and home energy management systems. The AMI solution will enable the future utilization of home devices using the Industry Smart Energy Profile 2.0 standard when it is ratified and available.

3.6.2. Energy Efficiency

As customers are more aware of their use, there is a natural learning that takes place and results in overall usage reduction. The costs associated with the Energy Efficiency program include the home energy devices such as in-home displays or home energy monitors or messages customized to one's personal devices.

3.6.3. PEV Enablement

AMI combined with smart charging technologies will allow PEV owners to charge their vehicles at non-peak times when electricity rates are cheapest. The costs associated in this model are driven by the incremental cost of electric vehicles relative to conventional vehicles. It is assumed that the PEV premium is $9,500 in 2012 and declining at a rate of 16% in the first ten years of the forecast and 8% in the last ten years.

3.6.4. Customer Technology Interface & Support

AMI when used in conjunction with Demand Response technology is an enabler to provide new options for customers who choose to opt-in to Demand Response and Energy Efficiency programs. The IT costs associated with integrating to these new systems is estimated in these costs. The integration interfaces would leverage industry standard interfaces where applicable such as NIST standards for integrating to new head-end Demand Response system (DRMS), Green Button interfaces for customer web portals, and interfaces to third-party vendors providing additional enabling technologies that may be leveraged by Ameren Illinois customers in the future.

3.6.5. Dynamic Pricing and Technology Education

Ameren Illinois understands significant pricing program and AMI/technology integration benefits can accrue to customers. Ameren Illinois has incorporated costs to engage and inform consumers on how those benefits enabled by AMI can be achieved. An ongoing part of Ameren Illinois' Consumer Education efforts, Ameren Illinois intends to communicate through multiple channels to instruct customers on using AMI enabled programs and technologies.

Ameren Illinois estimates that an annual budget of $0.5 million will be spent to inform and educate customers on the availability of AMI enabled pricing programs, technologies, and their benefits.

4. Ameren Illinois AMI Program Operational Benefits

Ameren Illinois has conducted a thorough assessment of all the ~~direct economic~~operational benefits that it expects to accrue through ~~100~~62% AMI implementation within ~~15~~8 years. Included in this analysis are direct operational benefits realized by Ameren Illinois and passed along to customer rates. These benefits are evaluated over a 20 year period and are expressed in incremental terms over the "business as usual" case.

~~Included in this analysis are both direct operational benefits (financial benefits realized by the utility and passed along to customer rates) and direct customer benefits (financial benefits realized by customers directly).~~

The following methodology was utilized to calculate steady-state benefits associated with the AMI implementation:

(1) Define the value drivers of the AMI solution components
(2) Identify and isolate the affected baseline costs and revenues that will be impacted
(3) Research and identify relevant cost savings and/or loss prevention percentages to be applied to the affected baseline

Over 20 years, Ameren Illinois expects financial benefits of approximately $~~859~~582 million. The following table outlines a summary of the major quantifiable benefits expected out of the AMI implementation.

Table ~~7~~9: Key Benefit Drivers (in $ millions, over 20 years)

Benefit Category	Cumulative Benefits
~~Direct Operational Benefits –~~ Reduction in Meter Reading Costs	$~~275~~238
~~Direct Operational Benefits –~~ Reduction in Field & Meter Services	$~~229~~209
~~Direct Operational Benefits –~~ Reduction in Unaccounted for Energy	$~~48~~41
~~Direct Operational Benefits –~~ Efficiency Improvement in ~~Billing and~~ Customer ~~Management~~Care	$~~1~~15
~~Direct Operational Benefits –~~ IT Cost Savings	$~~4~~5
~~Direct Operational Benefits –~~ Improved ~~Capital~~Distribution System Spend Efficiency	$~~27~~42
~~Direct Customer Benefits~~Outage Management Efficiency	$~~275~~32
TOTAL	**$~~859~~582**

4.1. ~~Direct Operational Benefits –~~ Reduction in Meter Reading Costs

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Ameren Illinois has been an early adopter of automated meter reading, with its Illinois program starting in the 1990s and aggressively expanding throughout the state from 2006 through 2010. Today, approximately 680,000 electric meters ~~and 476,000 gas meters~~ are automated – representing more than half of Ameren Illinois' electric customers. As a result of this automated meter reading, many of the meter reading labor benefits have been previously realized. Reduction in meter reading costs from the remaining 574,000 manual electric meters represents the largest area of benefits expected from Ameren Illinois' AMI implementation plan. Meter reads that are traditionally conducted through physical site visits to the customer premise can instead be done remotely through the AMI system. Benefits associated with reduction in meter reads represent the reduction in manual meter reading labor costs, associated IT costs, as well as vehicle / transportation costs.

Ameren Illinois estimates that ~~full~~62% deployment of AMI over ~~15~~8 years will result in meter reading cost savings of $~~275~~238 million over a 20 year period.

Table ~~8~~10: Meter Reading Cost Savings Breakdown (in $ millions, over 20 years)

Reduction in Meter Reading Costs	Cumulative Benefits
Reduction in Manual Meter Reading Expenses	$~~159~~176
Reduction in AMR Meter Reading Expenses	$~~106~~50
Reduction in Manual and AMR Meter IT Costs	$~~2~~3
Reduction in On-Cycle Meter Reading Vehicle Expense	$~~8~~9
TOTAL	**$~~275~~238**

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4.1.1. Reduction in Manual Meter Reading Expenses

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Of the 574,000 electric meters that are manually read, 45% of on-cycle reads are performed utilizing internal Ameren Illinois ~~-~~labor while the remaining reads are performed by ~~-~~contractors. Cost savings through the reduction in manual meter reads will be realized through a reduction in both in-house and contractor labor costs.

Meter reader workforce reductions are planned over the course of the ~~15~~8-year AMI implementation, and Ameren Illinois is planning to realize these workforce reductions through natural attrition and work re-assignment over time.

Quantifiable benefits related to manual meter reading savings are expected to be $~~159~~176 million over a 20 year business case time horizon. These cost savings take into account meter reads conducted by both internal meter readers as well as external contractors.

4.1.2. Reduction in AMR Meter Reading Expenses

Ameren Illinois ~~currently has~~ expects to begin replacing approximately 200,000 of its 680,000 AMR meters ~~that it expects to begin replacing~~ with AMI meters starting in year ~~2019.~~2018. All costs associated with AMR meter reading in the form of fees paid to external vendors will be eliminated as AMI meters replace existing AMR meters.

By eliminating these AMR costs over the AMI implementation time frame, Ameren Illinois expects to realize cost savings related to AMR meter reading of approximately $~~106~~50 million over a 20 year business case time horizon.

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4.1.3. Reduction in Manual ~~and AMR~~ Meter IT Costs

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O&M costs associated with the IT systems that support existing manual ~~and AMR~~ meter reads will be eliminated with the deployment of AMI meters. Benefits include cost savings associated with the support and upgrade of meter reading devices as well as software licensing and maintenance.

The current cost to support the existing MVRS hardware and software is roughly $175,000 per year. Ameren Illinois expects to be able to save ~~100~~60% of these costs after ~~full~~ deployment.

Ameren Illinois estimates reduction in manual ~~and AMR~~ meter IT costs to be approximately $~~2~~3 million over the 20 year business case time horizon.

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4.1.4. Reduction in On-Cycle Meter Reading Vehicle Expense

As non-AMR meters get replaced by AMI smart meters, the reduction in the need for manual meter reads will result in a reduction in associated vehicle costs for Ameren Illinois. Vehicle-related benefits include cost savings from fewer vehicles, fuel costs, vehicle insurance, and vehicle maintenance.

The current annual cost to operate and maintain vehicles for meter reading purposes is approximately $500,000. With AMI, Ameren Illinois expects reduction in manual and special meter reads to reduce vehicle costs by approximately $~~8~~9 million over the 20-year business case time horizon.

4.2. ~~Direct Operational Benefits –~~ Reduction in Field and Meter Services

AMI's smart metering and communication infrastructure enables utilities to perform several functions remotely that would otherwise require a field visit to the customer premise. As a result, significant cost savings through the reduction in the number of personnel and vehicles for field and meter services can be achieved. Benefits in this area can be seen in the reduction in manual disconnect / reconnect of meters, single light outages, need for manual re-reads, as well as customer equipment problem outages.

Ameren Illinois estimates that ~~full~~62% deployment of AMI over ~~15~~8 years will result in meter reading cost savings of $~~229~~209 million over the 20 year business case time horizon.

Table ~~9~~11: Field and Meter Savings Breakdown (in $ millions, over 20 years)

Reduction in Field & Meter Services	Cumulative Benefits
Reduction in Manual Disconnect / Reconnect of Meters	$~~136~~116
Reduction in Manual Off-Cycle / Special Meter Reads	$~~56~~62
Reduction in Field Services Vehicle Expense	$~~16~~14
Reduction in ~~Single Light-out~~"OK on Arrival" Outage Field Trips	$~~13~~11
Reduction in Customer Equipment Problem Outages	$~~1~~ -
Salvage Value of Replaced Meters	$1
Reduction in Nuisance Stopped Meter Orders	$~~6~~5
TOTAL	**$~~229~~209**

4.2.1. Reduction in Manual Disconnect / Reconnect of Meters

The remote connect / disconnect feature of AMI smart meters enables utilities to turn on and off services for new and cancelled accounts remotely without a field trip. This benefit not only applies to the ability to turn on and off services for regular move-in / move-out of customers, but also provides the ability to cancel service for non-paying customers. As a result, significant cost savings can be realized through the reduction in need for personnel and transportation costs to turn on / off services. Cost savings will also be seen through the time saved due to reduction in meter access challenges as a result of AMI.

From 2009 to 2011, Ameren Illinois received about 247,000 orders for electric disconnect / re-connect per year, of which about 89,000 per year were disconnects for non-~~-~~pay. The labor cost for manual disconnect / reconnect is approximately $~~8~~6 million per year currently. Ameren Illinois expects cost savings of approximately $~~136~~116 million from reduced labor associated with the ability to remotely turn on/off energy service over 20 years.

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4.2.2. Reduction in Manual Off-Cycle / Special Meter Reads

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Ameren Illinois currently incurs significant costs to conduct manual off-cycle special meter reads. These reads are conducted for tenant changes, re-reads, high bill inquiries, and other instances when a reading is needed off the normal read cycle reads etc. Labor cost savings will be realized through reduction in off-cycle / special meter reads as a result of AMI.

In 2011, Ameren Illinois conducted approximately 100,000 off-cycle reads. Quantifiable benefits related to off-cycle meter reading savings are expected to be approximately $~~56~~62 million over a 20 year business case time horizon.

4.2.3. Reduction in Field Services Vehicle Expense

With the reduction in field service visits to customer premises due to the above factors, there will also be a reduction in associated vehicle costs for Ameren Illinois. Vehicle-related benefits include cost savings from fewer vehicles, fuel costs, vehicle insurance, and vehicle maintenance.

The total benefit Ameren Illinois expects to realize through reduction in off cycle field services vehicle expense will be approximately $~~16~~14 million over the 20-year business case time horizon.

4.2.4. Reduction in "OK on Arrival" Outage Field Trips

AMI implementation is expected to result in cost savings associated with reduced outage "OK on Arrival" field trips to customer premises. With the ability to provide near real-time power and outage status information, AMI systems are able to test for loss of voltage at the service point and both detect outage conditions as well as obtain restoration status indication. As a result, "OK on Arrival" field trips will be virtually eliminated, in AMI areas, thereby leading to cost savings.

Ameren Illinois currently works about 7,600 orders for outages (both storm and non-storm related) that upon investigation are found to be "OK on Arrival". Ameren Illinois estimates that it will realize financial benefits related to reduction in "OK on Arrival" field trips of approximately $~~13~~11 million over the 20-year business case time horizon.

4.2.5. Reduction in "Customer Equipment Problem" Outage Field Trips

With AMI, Ameren Illinois will be able to determine whether the cause of an outage is the result of an electrical problem with the customer's equipment. This automated determination will help save dispatch labor and transportation costs for customer incidents that involve equipment failure.

Ameren Illinois estimates that while approximately 90% of "Customer Equipment Problem" related field trips can be eliminated as a result of AMI, 10% of orders will still require a field trip due to problems inside the meter base. Cost savings of approximately $~~1 million~~400,000 are expected over a period of 20 years.

4.2.6. Salvage Value of Replaced Meters

A small financial benefit of replacing electro-mechanical and AMR meters as part of Ameren Illinois' AMI deployment plan is the salvage value of meters that have remaining useful life.

Ameren Illinois has estimated a conservative salvage value of $1 per meter, thereby leading to benefits of approximately $1 million for the utility over the 20-year business case time horizon.

4.2.7. Reduction in Nuisance Stopped Meter Orders

Currently, Ameren Illinois receives approximately 34,700 orders for stuck / stopped electric meters annually. Of these, approximately 30% of the orders are found to be invalid / nuisance by the field & meter services personnel. With AMI, Ameren Illinois will be able to remotely detect whether the meter is stopped or malfunctioning, thereby eliminating the need for a premise visit to address an invalid stopped meter order.

Over the 20-year business case time horizon, Ameren Illinois expects benefits of approximately $~~6~~5 million related to reduction in nuisance stopped meter orders.

4.3. ~~Direct Operational Benefits –~~ Reduction in Unaccounted for Energy

Unaccounted for Energy (UFE) in the areas of meter tampering, energy theft, meter inaccuracy, and dead / stopped meters results in significant revenue loss for utilities. Through the use of smart meters and sophisticated MDM systems, UFE can be detected early and revenue losses related to unmetered energy can be reduced.

Ameren Illinois estimates that ~~full 100~~62% AMI implementation in ~~15~~8 years will help increase revenue from reduction in UFE by $~~48~~41 million over a 20 year period.

Table ~~10~~12: Field and Meter Savings Breakdown (in $ millions, over 20 years)

Reduction in Unaccounted for Energy	Cumulative Benefits
Theft / Tamper Detection & Reduction	$~~42~~36
Faster Identification of Dead Meters	$~~6~~5
TOTAL	**$~~48~~41**

4.3.1. Theft / Tamper Detection & Reduction

AMI systems significantly aid in the early detection of meter tampering and energy theft. Through the use of analytics software and AMI functionality that enables frequent recording of smart meter energy consumption, the detection of anomalous patterns of energy resulting from theft and tampering can be discovered. According to Chartwell, a market research company for utility customer care, marketing and smart grid, theft is estimated at 1% of a utilities' revenue.[2] Thus, the use of AMI can significantly reduce energy and revenue losses associated with energy theft.

In reviewing various public utility AMI filings, Ameren Illinois observed that other utilities estimated savings in the range of 0.5% - 1% of revenue associated with each AMI meter. Ameren Illinois conservatively estimates that AMI will help the utility save 0.25% of theft / tamper-associated revenue. This will result in cutting existing residential line losses by about 2.9%. Over a 20 year period, Ameren Illinois expects financial benefits from reduction in energy theft for residential customers to be approximately $~~42~~36 million.

[2] Chartwell Report, 11th Edition on AMI/AMR

4.3.2. Faster Identification of Dead Meters

The implementation of AMI systems helps utilities more quickly identify dead and/or stopped meters that can no longer measure electricity due to meter failure. This early identification helps utilities quickly take steps towards repairing or replacing the dead meter, thereby reducing potential revenue losses.

Ameren Illinois currently receives approximately 3,470 valid orders ~~,~~annually for dead residential meters with average residential consumption of about 1,000 kWh per month. With the use of AMI and a charge back period of 60 days, Ameren Illinois expects to realize financial benefits associated with the early identification of dead meters of approximately $~~6~~5 million over a 20 year time period.

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4.4. ~~Direct Operational Benefits – Efficiency Improvement~~Improvements in ~~Billing Functions~~Customer Care

An important benefit of AMI is the cost savings realized through efficiency ~~improvement~~improvements in ~~billing functions and~~ customer call volume and management. Meter reading errors are expected to be virtually eliminated and the need for calculation of estimated bills due to access issues will be significantly reduced~~.~~, in AMI areas. Efforts to raise awareness regarding AMI through marketing campaigns and customer education will increase customer adoption of self-service leading to an overall reduction in call volume. However, more complicated billing problems may increase due to expanded dynamic pricing. The potential to reduce float between meter read and customer billing will also drive greater benefits for Ameren Illinois.

Over a 20 year period, Ameren Illinois estimates $~~1~~15 million in cost savings through efficiency ~~improvement~~improvements in ~~billing and~~ customer call volume and management as a result of AMI.

Table ~~11~~13: Efficiency in Billing Breakout (in $ millions, over 20 years)

Efficiency Improvement in Billing and Customer Management	Cumulative Benefits
Reduction in Estimated Bills	~~-~~$-
Reduction in ~~Bill Inquiry Calls~~Call Volume	$~~0.5~~13
Reduction in Float between Meter Read and Customer Billing	$~~0.5~~1
Reduction in Customer Accounts Back-office Costs	$1
TOTAL	**$~~1~~15**

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4.4.1. Reduction in Estimated Bills

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The ability to remotely read meters on a frequent basis greatly reduces estimated bills that often result from meter access issues that currently prevent meter readers from obtaining reads in hard to access areas at the customer premise. Fewer customer service resources are thus expected to review exception reports, resolve billing errors and process adjustments.

Ameren Illinois has already received these benefits in its existing AMR areas. While it is believed that a reduction in estimated bills from its non-AMR areas will result in reduced workload for Ameren Illinois' Customer Accounting Department, there is likely to be an increase in more complicated billing problems due to expanded dynamic pricing. At this point, Ameren Illinois is taking a conservative approach and assuming that AMI will have a neutral effect on its Customer Accounting Department.

4.4.2. Reduction in ~~Bill Inquiry Calls~~Customer Call Volume

~~Detailed customer interval consumption data will allow call center associates to accurately identify when a customer had higher than normal energy consumption. Moreover, the availability of more energy use data is expected to drive down call durations.~~

~~Ameren Illinois currently receives about 250,000 calls annually related to billing questions. Since Ameren Illinois already has some of this capability in its existing AMR areas, this incremental benefit only applies in its non-AMR areas. As non-AMR meters are replaced with AMI, the utility expects benefits 11% reduction in bill inquiry calls, thereby resulting in approximately $500,000 in cost savings.~~
Comprehensive marketing campaigns and customer awareness programs will educate customers about the self-service options available to them from Ameren Illinois throughout the AMI roll-out.

Ameren Illinois receives approximately 5 million calls annually related to customer inquiries. Ameren Illinois is currently planning on further developing its customer self-service capabilities, including web and IVR enhancements channels. Ameren Illinois plan to increase the self-service marketing efforts during the AMI roll-out, encouraging portal use and promoting self-service within AMI communications. Ameren Illinois estimates it will see approximately a 5% reduction in call volume as a result of greater self-service adoption. This will also be driven by lower bill inquiry call volume due to reductions in estimated bills. The reduction in call volume over the 20 year business case time horizon will produce $13 million in cost savings.

4.4.3. Reduction in Float between Meter Read and Customer Billing

Ameren Illinois expects AMI to enable all accounts within AMI territories to be billed on the second day of the billing window. As a result of AMR implementation, Ameren Illinois is already able to receive a majority of its meter readings on the second day within the window. However, the remaining bills (about 20%) that are currently produced during the third and fourth days will now be generated during the second day as a result of AMI. This will accelerate Ameren Illinois' revenue stream and improve its cash flow.

Over the 20 year business case time horizon, Ameren Illinois expects benefits related to reduction in float between meter read and customer billing of approximately $~~500,000~~1 million dollars.

~~Direct Operational Benefits –~~

4.4.4. Reduction in Customer Accounts Back-office Costs

Detailed information regarding the status of each AMI meter will allow Ameren Illinois to detect stopped or faulty meters on a real-time basis. Currently, meters that have stopped or are not registering an accurate reading as a result of device failure require a manual intervention to investigate the issue. Through the implementation of AMI, Ameren Illinois expects to be able to reduce the back-office effort required to intervene on a stopped meter incident.

Over the 20 year period, the reduction in customer accounts back-office costs is estimated at $1 million dollars through a reduction in effort required to address stopped meters.

4.5. IT Cost Savings

Ameren Illinois currently ~~spends on~~uses 1.5 FTEs to support its existing Meter Data Management (MDM). Furthermore, in addition to the $36,000 it pays in annual software maintenance fees, it has also budgeted associated hardware purchase and upgrade costs. These costs will thus not be incurred for the AMI project, resulting in a benefit of $~~4~~5 million over the 20 year evaluation period

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~~**Table 12: IT Cost Savings (in $ millions, over 20 years)**~~

~~IT Cost Savings~~	~~Cumulative Benefits~~
~~IT Cost Savings~~	~~$4~~

4.6. ~~Operational Benefits –~~ Improved ~~Capital~~Distribution System Spend Efficiency

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Ameren Illinois also expects AMI to enable improvements in the distribution system planning efforts. AMI will provide detailed information across the distribution network that can be used to optimize investments in infrastructure improvements. Examples of data available by AMI that can be used in asset management are:

- Interval (time-based) consumption data at the customer level (and ability to aggregate up to transformer and circuit levels)
- Voltage information collected at each premise
- Momentary outage information

The total benefit from Improved Capital Spend Efficiency over the 20-year business case timeframe is $~~27~~42 million.

Table ~~13~~14: Asset Management Benefit Breakout (in $ millions, over 20 years)

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Improved Capital Spend Efficiency	Capital	O&M	Cumulative Benefits
Distribution System Management	$~~15~~12	$1	$~~16~~13
Asset Management Planning	$8	$6	$14
Avoided Meter Purchases	$~~11~~15	$0	$~~11~~15
TOTAL	**$~~26~~35**	**$~~1~~7**	**$~~27~~42**

4.6.1. Distribution System Management

Interval consumption data can be aggregated at the transformer level to help identify under-used and over-loaded transformers, as well as to properly size replacement transformers.

From 2006 through 2011, the average capital investment by Ameren Illinois in the low voltage distribution system was approximately $81 million per year, while the average O&M expense for the maintenance of overhead lines, underground lines, and line transformers was $75 million per year.

At ~~full~~62% AMI deployment, Ameren Illinois expects 1% capital savings and 0.1% reduction in O&M expenses related to low voltage distributed system management. Over the 20-year business case time horizon, this results in total benefits of approximately $~~16~~13 million, which is comprised of $~~15~~12 million in capital savings and $1 million in O&M avoided cost.

4.6.2. Asset Management Planning

Information received through AMI will provide more granular level system health and performance details. Using more detailed information from AMI enables Ameren Illinois to more accurately forecast load growth and evaluate system investments resulting in improved asset planning and strategies.

Over the 20 year business case time horizon improved asset planning and strategies will enable resource leveling and result in a total benefit of $14 million.

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~~4.6.2.~~4.6.3. Avoided Meter Purchases

This benefit category represents the cost savings realized by not having to replace existing non-AMR and AMR meters on an annual basis without AMI implementation. These include cost savings from reduced additions (meter costs), reduced replacements (meter costs), as well as reduced meter testing and installation costs (labor and material). The benefit from avoided meter purchases, however, is partially offset by the cost of -on-going replacement of AMI meters due to normal failure rates.

With an expected meter replacement rate of 3% and a meter addition rate of 0.25% annually, Ameren Illinois estimates cost savings from avoided meter replacements at approximately $~~11~~15 million over 20 years.

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4.7. Outage Management Efficiency

AMI will enable Ameren Illinois to obtain automated outage notification from the smart meters, receive specific location information as well as verify when power has been restored. These features will allow crews to be deployed more efficiently to outage areas further improving crew management efficiency. Additional truck rolls will also be eliminated by verifying, remotely, that all customers in an area have been restored before dispatching the crew to the next location.

With the implementation of AMI, outage restoration spend will improve by 10% resulting in $32 million of cost savings, $17 million in Capital and $15 million in O&M, over the 20 year business case time horizon.

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Table ~~Direct~~15: Outage Management Benefit Breakout (in $ millions, over 20 years)

Improved Outage Management Efficiency	Capital	O&M	Cumulative Benefits
Outage Management Efficiency	$17	$15	$32

~~4.7.~~5. Ameren Illinois AMI Customer/Societal Benefits

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While the above benefits are largely operational in nature and will ~~be directly captured by~~ flow to customers through Ameren Illinois and its operations~~, many of the~~ and rates, other benefits from AMI will be flow directly ~~or indirectly captured by~~ to Ameren Illinois customers. These will be captured by customers in the form of reduced electric rates due to the avoidance of shared and pass-through costs, all things being equal.

5.1. Quantified Customer/Societal Benefits

Quantified Customer/Societal Benefits are benefits that impact Ameren Illinois customers and are realized by those customers or by society as a whole, not by Ameren Illinois.

Table ~~14~~16 outlines a summary of the major quantifiable customer benefits expected out of the AMI implementation.

Table ~~14: Direct~~16: Quantified Customer Benefit Breakout (in $ millions, over 20 years)

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~~Direct~~Quantified Customer Benefits	Cumulative Benefits
Reduced Consumption on Inactive Meters	$~~14~~17
Reduced Uncollectible / Bad Debt Expense	$~~90~~59
Demand Response~~ Financial Benefit~~	$~~171~~406
Energy Efficiency	$24
PEV	$151
Carbon Reduction	$11
Customer Outage Reduction Benefit	$28
TOTAL	**$~~275~~695**

~~4.7.1.~~5.1.1. Reduced Consumption on Inactive Meters~~(CIM)~~

Ameren Illinois assigns electric meters to customer accounts and bills for usage on those meters to the assigned customer accounts. When a customer disconnects electric service at a premise (most often when they are vacating the premise), the customer account is disassociated with that electric meter. In the vast majority of cases, there is a corresponding connect request of electric service to the same premise (most often when a new occupant takes possession of a premise) on a date very close to the disconnect date.

Ameren Illinois does not physically disconnect electric service on the premise when a disconnect occurs in its existing AMR areas, and in some instances in its existing non-AMR areas. Rather, a "soft disconnect" usually occurs whereby a customer account is not associated with an electric meter during the gap between disconnect and connect. During the same gap, electric usage may still occur in some cases. Since there is not a customer account associated with the electric meter, no customer is billed for this usage.

A key feature of the AMI meters and infrastructure is the provision of a remote disconnect feature that will physically disconnect power to a premise when a disconnect request occurs. This will provide a significant decrease in unaccounted for consumption when meters are inactive.

Ameren Illinois estimates that approximately 12.1 GWh of electric energy is consumed on inactive meters on an annual basis. Ameren Illinois estimates it can reduce at least ~~90~~56% of this CIM with ~~the full~~62% implementation of AMI and associated manual methods.

Over the 20 year business case time horizon, cumulative benefits associated with reduced consumption on inactive meters are estimated at $~~14~~17 million.

~~**Table 15: Reduced Consumption Breakout (in $ million, over 20 years)**~~

~~4.7.2 Consumption on Inactive Meters~~	~~Cumulative Benefits~~
~~Reduced Consumption on Inactive Meters (GWh)~~	~~98.3 GWh~~
~~Reduced Consumption on Inactive Meters ($, millions)~~	~~$14 M~~

~~4.7.3.~~5.1.2. Uncollectible Expense ~~/~~ /Bad Debt

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Ameren Illinois incurs write-off expenses of approximately $17.8 million per year for electric ~~-~~customer accounts that are deemed to be uncollectible. Due to the manual nature of the existing disconnect for non-pay process, timing of disconnect for non-pay orders, and the existing workload, Ameren Illinois is not able to complete all the physical disconnect for non-pay orders issued in a given year.

AMI meters and infrastructure will be used to perform a remote disconnect and re-connect based on the regulatory timeframe allowed. Ameren Illinois estimates that AMI will help it recover uncollectible expenses through both 1) completing remote disconnects for all non-pay disconnect orders typically issued, and 2) revising collection processes within existing regulations to increase the number of disconnect for non-pay orders issued. Approximately $3.5~~.8~~ million annual reduction in uncollectible expense is estimated after ~~100~~62% AMI rollout with associated manual methods.

Over the 20 year business case time horizon, cumulative benefits associated with reduced uncollectible expense / bad debt are estimated at approximately $~~90~~59 million.

~~**Table 16: Reduced Uncollectible Expense Breakout (in $ million, over 20 years)**~~

~~Uncollectible Expense / Bad Debt~~	~~Cumulative Benefits~~
~~Reduced Uncollectible Expense / Bad Debt~~	~~$90~~

~~4.7.4.~~5.1.3. Demand ~~Benefits~~Response

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~~Another advantage of the~~Once AMI ~~meters and infrastructure rollout~~ is ~~the ability to impact customer usage by aligning~~in place, retail rates can be aligned more closely with the real-time costs of energy. ~~It is estimated that this will result in the shifting of a portion of the electric usage from peak times to off-peak times. This, in turn, will decrease the potential~~ Dynamic pricing and other customer programs are designed to incentivize customers to reduce load during the most expensive hours of the day, thus decreasing the aggregate electricity demand during peak times.

To quantify the potential benefits of Demand Response, Ameren Illinois expects that all Residential customers will be eligible to participate in a Peak Time Rebate program for electricity curtailed during critical peak hours. Residential customers will also have opportunities to opt-in to a Critical Peak Pricing rate with and without enabling technologies, and Direct Load Control or Time-of-Use with smart charging for electric vehicles. Commercial and Industrial customers may be on a Critical Peak Pricing Program, with or without Automated

Demand Response. Additionally, certain C&I customers may qualify to participate in a Direct Load Control program. These programs may be provided by the utility or by third party service providers.

The benefits of these programs are largely driven by participation rates in the programs and the change in peak load usage per customer, valued at the appropriate avoided capacity and energy costs and avoided carbon emissions. The cost/benefit analysis assumes a likely participation scenario in which 40% of the residential customers who receive AMI will be on some type of Demand Response (mentioned previously) and 3-6% participation among Commercial and Industrial customers with AMI.

Over the 20 year Business Case time horizon the combined benefits from Demand Response are estimated at $406 million.

5.1.4. Energy Efficiency

AMI-enabled Energy Efficiency programs and technologies can contribute to increased Energy Efficiency throughout the day. When customers are more aware of their usage either by using their in-home displays or via the web, they often adjust their behavior and overall energy usage is reduced.

Over the 20 year Business Case time horizon the combined benefits from Energy Efficiency are estimated at $24 million.

5.1.5. Enabling PEVs

AMI combined with smart charging technologies will allow PEV owners to charge their vehicles at non-peak times when electricity rates are cheapest. This will lower the PEV cost per mile driven and encourage additional consumers to switch to PEVs (compared to the flat-rate case). Society will benefit from this switch since electricity is cheaper and produces less carbon dioxide per mile driven than gasoline. Assuming that 0.7 percent of vehicles among customers with AMI in the Ameren Illinois territory are PEVs (and assuming furthermore that these PEVS would not have been purchased but for AMI and time-of-use rates that lower the cost of operating these vehicles), the total 20 year Business Case nominal benefit from PEVs is $151 million.

5.1.6. Carbon Reduction

When energy emissions are lowered due to the Energy Efficiency (EE) programs described above, less carbon is emitted. Due to the smart charging of electric vehicles, there would be an increase in off-peak energy usage, emitting more carbon. However, this increase is more than offset by the reduced carbon emissions from avoided gasoline usage in conventional cars. The change in carbon emissions is monetized using the expected price of carbon in the future. Ameren Illinois assumes that the price of carbon will be zero until 2025, at which point it is $30 per metric ton in nominal terms and by 2032 it rises to $51 per metric ton.

The total 20 year Business Case benefits from reduced carbon emissions are $11 million. This includes $10 million in carbon benefits associated with Energy Efficiency gains from EE programs and $1 million from net reduced carbon emissions associated with electric vehicles.

5.1.7. Customer Outage Reduction Benefit

AMI facilitates restoring power quicker through the use of the last gasp feature of the meter and the system's ability to ping a meter. Benefits flow to customers in the form of the avoided economic losses they experience due to unreliability. For the purposes of this estimate, various industry reports were reviewed. While the value per customer class did vary slightly and different methods were found in how to value the reliability benefit,

there was general consensus that the reliability benefit is an item to be considered when making smart grid investments.

Ameren Illinois utilized the ICE (interruption cost estimation) calculator, which was funded by Lawrence Berkley National Lab and DOE in conjunction with Freeman, Sullivan and Company. The methodology[3] for calculating reliability benefits involved using Ameren Illinois' SAIFI and CAIDI information, survey data from the ICE calculator, and information regarding the number of residential and small commercial customers. Large Commercial and Industrial customers were excluded from the analysis since many of these customers have backup strategies for reliability purposes.

The total 20-year customer value for outage reduction is $28 million.

5.2. Additional Customer/Societal Benefits

Additional Customer/Societal Benefits are benefits realized by the broader communities that Ameren Illinois serves, but these benefits are not strictly or wholly tied to the AMI implementation.

~~4.7.5.~~5.2.1. Safety and Emergency Response

With the implementation of AMI, utilities can more rapidly cooperate with fire departments and other agencies to respond to emergencies. For example, when the local fire department calls to shut down power to a burning home, the utility can quickly respond by remotely disconnecting power via the disconnect switch in the meter.

Furthermore, AMI will also impact employee and vendor safety by eliminating or reducing physical customer premises trips for meter reading, disconnections and other reasons. Safety incidents by field/meters services and meter readers are often a large portion of the overall safety incidents for utilities.

~~4.7.6.~~5.2.2. Local Economy

With the rollout of AMI, several jobs will be created during the 8 year field deployment, as well as new skills needed for the back office, communications and IT systems development/maintenance. This will provide a non-trivial impact to the local workforce. Macroeconomic benefits that can enhance the local economy may arise from changes in the expenditure patterns of these workers/consumers.

~~4.7.7.~~5.2.3. Market Competition

Competition is fostered on two levels: from a market level and from a supplier component level. With AMI, greater information on energy usage will be available. It is a common belief that the expanded service choices enabled by advanced metering and communication technology are essential if consumers are to realize the full benefits of wholesale competition.[4]

In addition, Ameren Illinois is specifying the use of standards in choosing the AMI vendor. At the endpoint, Smart Energy Profile is a key standard to foster interoperability among vendors wanting to offer services in the

[3] *The 2011 NARUC report, "Evaluating Smart Grid Reliability Benefits for Illinois"*, January 2011
[4] *Characterizing and Quantifying the Societal Benefits Attributable to Smart Metering Investments*, EPRI report, July 2008

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home energy management area. Using a non-proprietary standard-based HAN solution for the AMI system will prevent vendor "lock-in" and enable more competition for parties desiring to provide solutions.

5.2.4. Other Environmental Benefits

Electricity generation creates the majority of the U.S. sulfur dioxide (SO_2) pollution (primarily from burning coal) and is the second-largest emitter of nitrogen oxides (NOx) after vehicles. As AMI enables utilities to obtain more information and as utilities educate their customers on energy use and choice about using energy, it is expected that more customers will subscribe to various demand management programs. With the AMI-enabled pricing programs, price signals produced via the AMI devices could motivate customers to shift their energy consumption or lower it. This action would smooth out the utility's load curve, thereby reducing the need for high-emission peaking plants in some cases. As customers reduce their peak usage, SO_2 reductions can be achieved thereby eliminating pollution and helping to preserve our environment. Emissions are further reduced by the reduction in vehicle miles driven due to the elimination of manual meter reading and field visits for disconnect / reconnect, stopped meter, and outage investigations.

5.2.5. PEV

Only the benefits to society of AMI for the additional PEV ownership attributable to AMI were quantified. However, there are still several benefits from AMI that arise from those customers who would have purchased PEVs in the absence of AMI. By incentivizing these PEV owners to charge their vehicles during off-peak periods, AMI will reduce the amount of generation, transmission and distribution capacity needed by Ameren. Furthermore, as battery technology continues to evolve and mature, many believe that the PEVs can be utilized at certain times to provide energy back into the electric grid. AMI's net metering capabilities will be needed to measure the flow of energy in both directions. This is referred to as net metering to determine when the consumer is using power versus supplying. This can potentially be a very valuable resource in integrating more renewable generation resources into the grid.

~~4.7.8.~~5.2.6. Distributed Generation

Today, two meters are utilized at a residential level for distributed generation to measure when energy is being consumed from the grid versus when energy is being put out on the grid. With the new AMI meters, one single meter can be utilized in these situations. Net Metering with AMI meters records when consumers are using power versus supplying it. This reduces the costs for both the utility and the customer. Furthermore, with this added net metering functionality, utilities can ubiquitously offer customers new programs for renewable integration without having to add or change equipment. For example, utilities can offer programs around roof-top solar or solar hot water heaters.

5.2.7. Variable Generation

AMI allows for dynamic prices that reflect shifting supply conditions. In doing so, AMI creates an additional tool in managing this variable generation - customer demand response. For example, a smart-charging PEV can help balance the grid at night by charging when the wind gusts and putting additional electricity back on the grid when it does not.

~~4.7.9.~~5.2.8. New Services

AMI is a foundational infrastructure that may allow for services that expand into the home for smart appliances. Whirlpool and GE are among some of the leading brands working to integrate smart appliances with AMI.

Whirlpool received $19 million in U.S. Department of Energy stimulus funding to support the manufacturing and commercialization of smart appliances that would communicate with AMI over the home area network (HAN). Ameren Illinois intends to purchase AMI meters that are capable of implementing the industry-embraced standard called Smart Energy Profile that governs how third parties interact with the metered information.

Furthermore, utilities can enable programs with customers to reduce load and will now have the capability of monitoring individual customer actions, such as verification that requested load reduction actually takes place

~~4.7.10.~~5.2.9. **Customer Convenience**

With the rollout of AMI, utilities will be able to provide better customer service, especially around customer-directed shut-off and reconnection dates. These improvements in service represent a non-monetary value to the customer, but they generally result in increased levels of customer satisfaction.

Also, for those customers with indoor meters, utilities will no longer have to make arrangements to get access to the building or home to read the meters.

~~Since the dynamic pricing programs (the current Real Time Pricing / Power Smart Pricing, and the new required peak-time rebate program) are planned to be voluntary, the amount of benefits achieved largely depends on the customer opt-in rate. Based on an estimated coincident peak demand of 7835 MW in 2012, Ameren Illinois estimates the customer participation in dynamic pricing programs and achievable demand response potential as:~~

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Table 17: Customer Type Breakout (in $ million, over 20 years)

Customer Type	Achievable Demand Response Potential (from FERC study*)	% of Customers on Dynamic Pricing by 2031 (from FERC** study)	Estimated % of Ameren Illinois Customers on Dynamic Pricing Program by 2031	Estimated Ameren Illinois Achievable Demand Response Potential	Estimated Annual Demand Response Potential (2031)
Residential	3.1%	67.5%	30%	1.38%	108 MW
Small Commercial & Industrial	0.0%	67.5%	10%	0.0%	0 MW
Medium Commercial & Industrial	0.1%	67.5%	10%	0.01%	1 MW
Large Commercial & Industrial	1.0%	67.5%	10%	0.15%	12 MW

** A National Assessment of Demand Response Potential" issued by FERC in June 2009*
*** The achievable scenario in the FERC study assumes 60% - 75% of customers remain on dynamic pricing. 67.5% is the average between 60% and 75%*

The potential financial benefit for this peak demand response reduction is largely dependent on the dollar-value assigned to each MW in peak demand reduction. Ameren Illinois has estimated this using a combination of external (MISO Annual Cost of New Entry 2011 report) and internal Ameren estimates. The table below shows the total $ per MW estimates:

Table 18: Demand Response Breakout

Year	Total Estimated Incremental Demand Response (in MW)	$ per MW Demand Response Factor	Annual Savings (in $ millions)
2012	0	$29,881	$0
2013	0	$30,921	$0
2014	0	$35,438	$0
2015	0	$56,381	$0
2016	1	$77,353	$0
2017	3	$98,354	$0
2018	6	$119,384	$1
2019	11	$140,446	$2
2020	17	$161,540	$3
2021	24	$166,386	$4
2022	33	$171,378	$6
2023	42	$176,519	$7
2024	53	$181,815	$10

Year	Total Estimated Incremental Demand Response (in MW)	$ per MW Demand Response Factor	Annual Savings (in $ millions)
2025	65	$187,269	$12
2026	78	$192,887	$15
2027	91	$198,674	$18
2028	98	$204,634	$20
2029	106	$210,773	$22
2030	113	$217,096	$25
2031	121	$223,609	$27

The total financial benefit for demand response is $27 million once the target customer participation rate is achieved in 2031. This results in a 20-year total benefit of $171 million.

Table 19: Demand Response Breakout (over 20 years)

Demand Response	Cumulative Benefits
Demand Response Reduction (MW)	861 MW
Demand Response Financial Benefit ($, millions)	$171

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5.6. Ameren Illinois AMI Cost / Benefit Analysis

For the purposes of comparing the benefits against the costs for the AMI program, Ameren Illinois has developed a robust approach that uses several different evaluation methodologies, including:

- Calculation of Terminal Value
- Payback period
- NPV analysis
- Total Resource Cost (TRC) analysis

The timeframe of the primary business case is 20 years for both benefits and costs, which aligns with the estimated useful life for the AMI-related investments.

Terminal value (continuation of benefits and costs beyond 20 years) was also included to reflect the useful life of AMI infrastructure remaining after the 20-year period (due to the staggered rollout schedule). In fact, approximately 4038% of the installed meters in 20312032 will still have at least 105 years of useful life remaining after the 20 year investment evaluation ends.

The cost/benefit analysis is taken from the customer perspective, with costs and benefits modeled as revenue requirement adjustments.

In general, costs are estimated and attributed to the year in which the cost is incurred. Benefits are attributed to the year in which they will be realized, which generally trails the occurrence of the related cost by one year to three years (e.g. customer benefits will be realized the year following the installation of the AMI meters for that portion of the customers).

Included in this analysis are all the benefits and costs across the categories in sections 3 and 4, summarized in the table belowTable 17:

Table ~~20~~17: Cash-Basis Benefit & Cost Summary ($ in millions, over 20 years, non-discounted)

Key Cost / Benefit Drivers	Total
Benefits	
~~Direct~~ Utility O&M Benefits	$~~557~~528
~~Direct~~ Utility Capital Benefits	$~~27~~53
~~Direct~~ Customer/Societal Benefits	$~~275~~695
Total (nominal)	**$~~859~~1,277**
Costs	
AMI Meter & Communications Infrastructure	($~~199~~)129)
IT Systems & Integration	($~~251~~)294)
AMI Operations	($~~93~~)69)
Project Management & Associated Costs	($~~7~~)16)
~~**Total (nominal)**~~Manual Methods to Meet Performance Metrics	($~~**550**~~)5)
Demand Response/Energy Efficiency Program	($53)
~~**Terminal Value in Year 2031**~~ **Total (nominal)**	**~~$156~~($566)**
Terminal Value in Year 2032	**$243**

From a customer perspective, the impacts of the benefits and costs will take the form of changes to rates and direct customer benefits. Changes to rates are driven by O&M, depreciation, tax and revenue-requirement changes. The following table summarizes the customer benefits.

Table ~~21~~18: Customer Impact Summary Table ($ in millions, over 20 years, non-discounted)

Net Customer Impact	TOTAL
O&M Expenses Net Change	$~~325~~234
Depreciation Net Change (including stranded investment in existing meters)	($~~221~~)229)
Taxes Net Change	($~~48~~)32)
Return Requirements Net Change	($~~111~~)71)
Direct Customer Benefits	$~~431~~938
Total (nominal)	**$~~376~~840**

~~5.1~~6.1. Calculation of Terminal Value

As Ameren Illinois is planning on ~~a 15~~ an 8 year rollout of AMI meters across 62% of its ~~service territory~~customers, it is estimating an overall useful life of more than 20 years for the entire AMI system. While it is common practice for AMI business cases to have a 20-year timeframe, Ameren Illinois feels it is prudent to include an estimate of the business case beyond the 20-year window. As stated previously, in ~~2031~~2032 (the last year of the 20-year business case timeframe) approximately ~~40~~38% of the installed meters will still have a

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remaining useful life of at least ~~10~~5 years. It is assumed that the AMI system will still be at critical mass and operating until the number of active meters with remaining depreciable life dips below 100,000.

To capture the business case impacts of the remaining useful life of the AMI-related assets beyond the 20-year business case timeframe, a terminal value analysis was used. This involves using benefit and costs from the final years of the NPV analysis and projecting the future years based on that.

Several key steps are involved in the Terminal Value analysis:

1. Determine when there is no longer critical mass of active meters with remaining depreciable life (at least 100,000 active meters) – 2038 is the last year of critical mass in the base scenario
2. ~~1.~~Identify the average fixed annual costs for operating and maintaining the AMI system – $14 million was calculated by averaging the AMI-related O&M expense for 2028~~2027~~ through ~~2031~~2032
3. ~~2.~~Identify the average variable annual net benefit per meter (total benefits - variable costs) – $~~52.14~~121.66 was calculated by averaging the net benefit for ~~2027~~2028 through ~~2031.~~2032. This value is reduced to a 50% level on a straight-line basis during the 15 years of the TV analysis.
4. ~~3.~~Calculate the net impact by year for each year remaining on useful life of meters ~~(~~up to the point where there is not critical mass of the AMI system – declining from ~~1.3 million meters in 2031 to 13~~approx. 822,000 meters in ~~2046~~2033 to approx. 179,000 meters in 2038)
5. ~~4.~~Calculate the NPV of these net impacts using the customer-relevant discount rate of 3.62% (20-year Treasury Rate) to get the Terminal Value in ~~2031~~2032
6. ~~5.~~Discount the ~~2031~~2032 Terminal Value to ~~2012~~2013 using the same discount rate

This results in a terminal value in ~~2031~~2032 of $~~156~~243 million. By discounting this back to ~~2012~~2013, the terminal value yields an additional present value $~~77~~119 million:

Table ~~25~~19: Terminal value result ($ in millions)

Result	Total
NPV of Terminal Value in ~~2031~~2032	$~~156~~243
NPV of Terminal Value in ~~2012~~2013	$~~77~~ 119

~~5.2~~6.2. Payback Period

The first business case methodology used by Ameren Illinois is the payback period analysis. This involves calculating when the cumulative customer benefits equals and begins to exceed the cumulative customer cost stream. This is useful in understanding to what extent the realization of the benefits lag the incurrence of the costs.

Below is a summary of the benefit & cost cash flows along with the cumulative cash flow:

Table ~~22~~20: Annual & Cumulative Cost / Benefit Cash Flow (in $ millions, non-discounted)

Year	Annual Net Customer Impact	Cumulative Net Customer Impact
~~2012~~2013	(~~2~~)17)	~~(2)~~(17)
2014~~2013~~	(~~13~~)27)	~~(15)~~(44)
2015~~2014~~	(~~29~~)39)	~~(44)~~(84)
2016~~2015~~	(~~37~~)43)	~~(81)~~(127)
2017~~2016~~	(~~32~~)39)	

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Year	Annual Net Customer Impact	Cumulative Net Customer Impact
		~~(113)~~(166)
2018~~2017~~	(29)	~~(142)~~(195)
2019~~2018~~	(~~21~~)13)	~~(163)~~(208)
~~2019~~2020	~~(~~10~~)~~	~~(173)~~(198)
2021~~2020~~	~~0~~25	~~———~~(173)
2022~~2021~~	~~6~~37	~~(167)~~(137)
~~2022~~2023	~~11~~47	~~(156)~~(90)
2024~~2023~~	~~17~~56	~~(139)~~(34)
2025~~2024~~	~~22~~63	~~(117)~~29
~~2025~~2026	~~28~~67	~~(89)~~96
2027~~2026~~	~~34~~74	~~(55)~~170
2028~~2027~~	~~45~~78	~~(10)~~247
~~2028~~2029	~~50~~82	~~40~~ 329
2030~~2029~~	~~55~~86	~~95~~ 415
2031~~2030~~	~~60~~90	~~155~~ 504
~~2031~~2032	~~65~~93	~~220~~ 597
Terminal Value (~~2031~~)2032)	~~156~~243	~~376~~840

As can be seen in the table above, the payback period for the AMI business case is ~~16~~13 years. In other words, the cumulative benefits will begin to exceed the cumulative costs in ~~early~~ 2025.~~2028.~~ This payback period is reasonable, especially given the following factors:

- The bulk of the capital investment is in the first six years of the project duration
- The need to maintain multiple meter reading capabilities (processes & technologies) during the rollout period (manual read, AMR, and AMI during first seven years; AMR and AMI during ~~next seven~~the remaining years)
- The rollout of the meters is over ~~a 15~~an 8 year period, with ~~50~~62% of the meters deployed by ~~2020~~2019

Figure 3: Payback Summary ($ millions)

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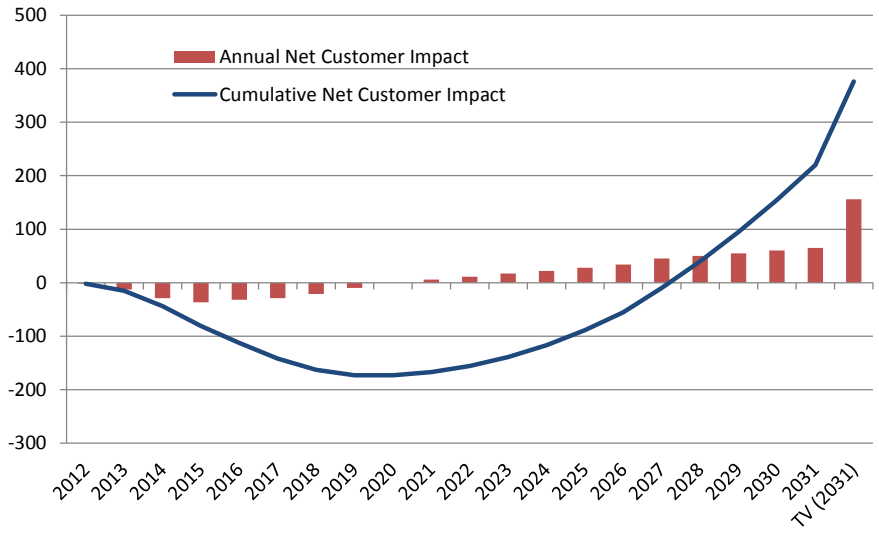

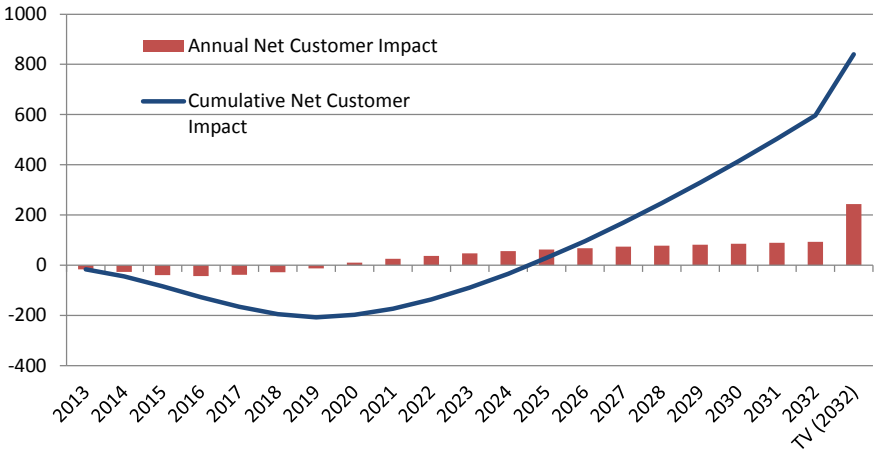

~~5.3~~6.3. Net Present Value

The second methodology used to evaluate the AMI business case is a Net Present Value (NPV) analysis. In this analysis, the annual costs and benefits cash flows of the AMI program are discounted by a customer-relevant discount rate. Here, the 20-year Treasury Bill rate of 3.62% is used. This results in an estimate of the economic value of the investment.

In this analysis, any NPV of greater than zero signifies an investment that earns a positive financial return after accounting for the time-value of money.

Below is a summary of the discounted net benefit/cost per year:

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Table ~~23~~21: Annual Discounted Net Customer Benefit (in $ millions, discounted)

Year	Net Customer Benefit
~~2012~~2013	(~~2~~17)
2014~~2013~~	(~~13~~)25)
2015~~2014~~	(~~27~~)36)
2016~~2015~~	(~~33~~)38)
2017~~2016~~	(~~28~~)32)
2018~~2017~~	(~~24~~)23)
2019~~2018~~	(~~17~~)10)
2020~~2019~~	(~~7~~)
2021~~2020~~	~~0~~18
~~2021~~2022	~~4~~26
2023~~2022~~	~~8~~32
2024~~2023~~	~~11~~36
2025~~2024~~	~~14~~40
2026~~2025~~	~~18~~41
2027~~2026~~	~~21~~43
2028~~2027~~	~~27~~44
2029~~2028~~	~~29~~45
2030~~2029~~	~~30~~45
2031~~2030~~	~~32~~ 46
~~2031~~2032	~~33~~ 46
TV (Terminal Value)	~~$77~~119
TOTAL (NPV)	**~~$153~~**406

As seen above, the NPV for the AMI business case is $~~153~~406 million.

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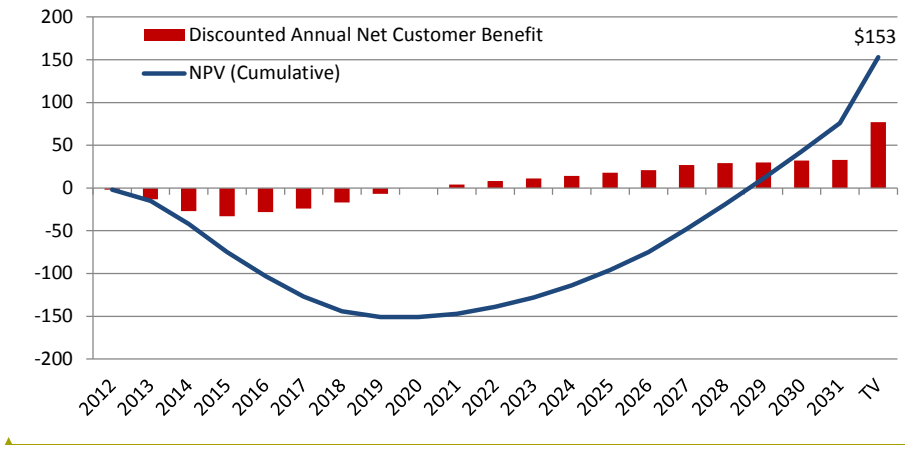
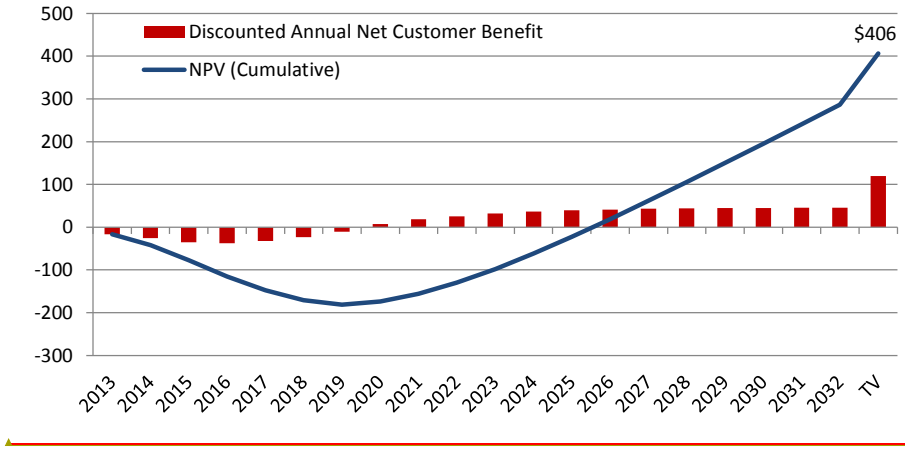
Figure 4: NPV Summary ($ millions)





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~~5.~~46.4. Total Resource Costs (TRC)

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Ameren Illinois also used a Total Resource Costs (TRC) analysis, which is a comparison of the total costs of the project (from both the utility and customer perspective) with the total benefits of the project (again, from both the ~~utility~~utility and customer perspective).

Similar to the NPV analysis, both the benefits and costs are discounted to a net present value using a customer-relevant discount rate. Again, the 20-year Treasury Rate of 3.62% is used. The TRC is then calculated as ratio of the present value of benefits to the present value of costs.

For the purposes of this analysis, several simplifying assumptions were used in calculating the TRC. Specifically, Ameren Illinois- used the net O&M and capital impacts as inputs into this analysis. Ameren Illinois considered net impacts that are negative as costs and net impacts that are positive as benefits. For example,

net O&M is negative in the period of ~~2012-2016~~2013-2017, so those were considered as costs for the TRC analysis. The positive net O&M values in years ~~2017-2031~~2018-2032 were considered as benefits. Terminal value was included as a net benefit in the Gross Resource Benefits.

The ~~results~~result of the TRC analysis is a TRC of 1.~~37~~87, which is summarized in ~~the table below.~~

Table 22.

Table ~~24~~22: Total Resource Costs Analysis Summary ($ in millions, over 20 years)

Category	TOTAL
Gross Resource Benefits (nominal)	$~~988~~1,469
PV of Gross Resource Benefits	$~~570~~871
Gross Resource Costs (nominal)	$~~607~~629
PV of Gross Resource Costs	$~~417~~466
Total Resource Costs (ratio of PV of Gross Resource Benefits to PV of Gross Resource Costs)	**1.~~37~~87**

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6.7. Sensitivity Analysis

Ameren Illinois acknowledges that despite a meticulous and data-driven approach to conducting the cost / benefit analysis, the longer-term nature of the business case implies inherent uncertainties in the estimates of several AMI cost and benefit drivers. Ameren Illinois has thus conducted sensitivity analysis to identify the impact of changes to certain drivers on the base case.

6.1.7.1. Approach and Assumptions

Outlined in Table 2523 is a summary of all the cost and benefit drivers that were subjected to sensitivity analysis. The table also highlights the range of values that each sensitivity parameters was subjected to, the resulting NPV, and the change in NPV from the base case.

Table 2523: Sensitivity Analysis Variables, Assumptions, and Impact on NPV

Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
AMI Implementation TypePeriod	10062% Electric & Associated GasStandalone Implementation over 158 years (62% Electric Allocated)	10062% Electric Standalone Implementation over 1510 years	Ameren Illinois' cost-/-benefit analysis is prepared for an Electric and associated Gas AMI Standalone implementation over 158 years. For the purpose of sensitivity analysis, Ameren Illinois assumed an Electric Standalone (no Gas) AMI implementation over 1510 years.	$56393 million
AMI Implementation PeriodDeployment Area	10062% Electric & Associated GasStandalone Implementation over 158 years	62100% Electric & Associated GasStandalone Implementation over 1015 years (then stop)	Ameren Illinois' cost-/-benefit analysis is prepared for a 100%an Electric and associated Gas AMIStandalone implementation over 158 years. For the purpose of sensitivity analysis, Ameren Illinois also assumed a 62%an Electric & Associated Gas implementation over 10 years. No furtherStandalone AMI implementation would take place after the first 10 years in this case.over 15 years.	$47711 million

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Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
O&M Benefits	$557 million	-30% to +15%[5]	Ameren Illinois' projected O&M benefits are driven by a data-focused and rigorous approach to estimations around cost reductions and loss prevention in numerous areas such as meter reading, field & meter services, UFE, billing and customer management etc. However, despite the analytical approach, unforeseen circumstances may cause the projected O&M benefits to vary. In order to calculate a range for the O&M benefits, Ameren Illinois assumes a 30% decrease and a 15% increase in O&M benefits over the 20-year business case time horizon.	[$~~13~~287 - $466] million~~, $224 million~~]
O&M Costs	$236 million	-15% to +30%[5]	Ameren Illinois' projected O&M costs are based on a comprehensive assessment of the various drivers and associated yearly costs to operate and maintain the AMI infrastructure. However, due to the long-term nature of the AMI deployment, certain costs such as those to operate and maintain the AMI Communications Network as well as IT-related labor software maintenance costs may vary. Thus, Ameren Illinois assumes a 30% increase and a 15% decrease in O&M costs for purposes of sensitivity analysis	[$~~95~~337 - $440] million~~, $183 million~~]

[5] Based on the Association for the Advancement of Cost Engineering (AACE) *Cost Estimate Classification System*, using Class 3 estimate and Expected Accuracy Range of 3 (i.e. 3x multiplier of +10%/-5% for costs). Benefits use the same ranges with inverse values.

Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
Capital Costs	$314 million	-15% to +30%[5]	Ameren Illinois' projected capital costs for meters and communications network hardware are based on average pricing obtained in response to RFIs. Capital costs for IT systems and labor, and management labor, while highly data driven and based on estimates from internal and external experts, contain a level of uncertainty given the long-term nature and scale of AMI deployment. Ameren Illinois thus assumes a 30% increase and a 15% decrease in capital costs for the purposes of sensitivity analysis	[$~~98~~336 - $442] million~~, $251 million]~~
CIM Benefits ($ per KWH Recovery)	10.29 cents / KWH	5.3 cents / KWH	In the base case, Ameren Illinois assumes that it will be able to bill for and thereby recover the full 10.29 cents / KWH for consumption on inactive meters once AMI is implemented For purposes of sensitivity analysis, Ameren Illinois assumes that even if there is no tenant to bill for the entire lost energy consumption, it could still save energy supply cost of 5.3 cents / KWH	$~~147~~400 million
Uncollectible Benefits	$3.~~5~~75 million per year after 10 years of AMI rollout	-30% to +15%[5]	For the base case, Ameren Illinois assumes that at ~~100~~62% AMI rollout, it will be able to reduce uncollectible electric expense by approximately ~~32% ($5~~20% ($3.75 million per year). Since the ability to reduce bad debt expense depends on a multitude of factors including recovery rate after disconnect and increase in recoverable amount through revised collection process, Ameren Illinois estimates a 30% decrease ($~~4~~2.6 million per year at ~~100~~62% rollout) and a 15% increase ($~~6.6~~4.3 million per year at ~~100~~62% rollout) in uncollectible benefits for the purposes of sensitivity analysis	[$~~130~~393 - $413] million~~, $165 million]~~

Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
Customer Opt-Out	0%	0.5% - 2.5%	The base case presented in this document assumes that 100% of the customers will participate in Ameren Illinois' AMI plan. However, Ameren Illinois is conducting sensitivity analysis to determine the impact of 0.5% and 2.5% customer opt-out. The effect of the customer opt-out is modeled assuming the additional costs of a one-time meter change and system set-up fee, a monthly off-cycle read fee, and the loss of potential AMI related benefits. If a Customer opt-out option is determined as necessary, it is recommended for fairness to those customers who do not opt-out, the associated costs and reduction in potential AMI related benefits should be ~~born~~borne by those customers that are allowed to Opt-out.	[$~~133~~372 - $402] million~~, $149 million~~]
~~Disconnects~~Add Premise Visit Costs for Non-Pay Disconnects	No premise visits needed for disconnect of non-paying customers	Premise visits needed for disconnect of non-paying customers	In the base case, Ameren Illinois assumes that it will realize cost savings from ~~reduced visits as a result of remote~~automating manual disconnects for non-paying customers~~.~~, plus benefits from reduced uncollectibles. For purposes of this sensitivity analysis, Ameren Illinois assumes that ~~disconnects for non-paying customers~~it will still ~~require a site visit. Thus, all the operational savings from automating the orders~~realize these benefits. However an additional cost will be incurred for a properly skilled workforce to continue to make premise visits prior to disconnecting for non-pay ~~disconnects and the Uncollectible benefits will be eliminated.~~.	$~~35~~396 million

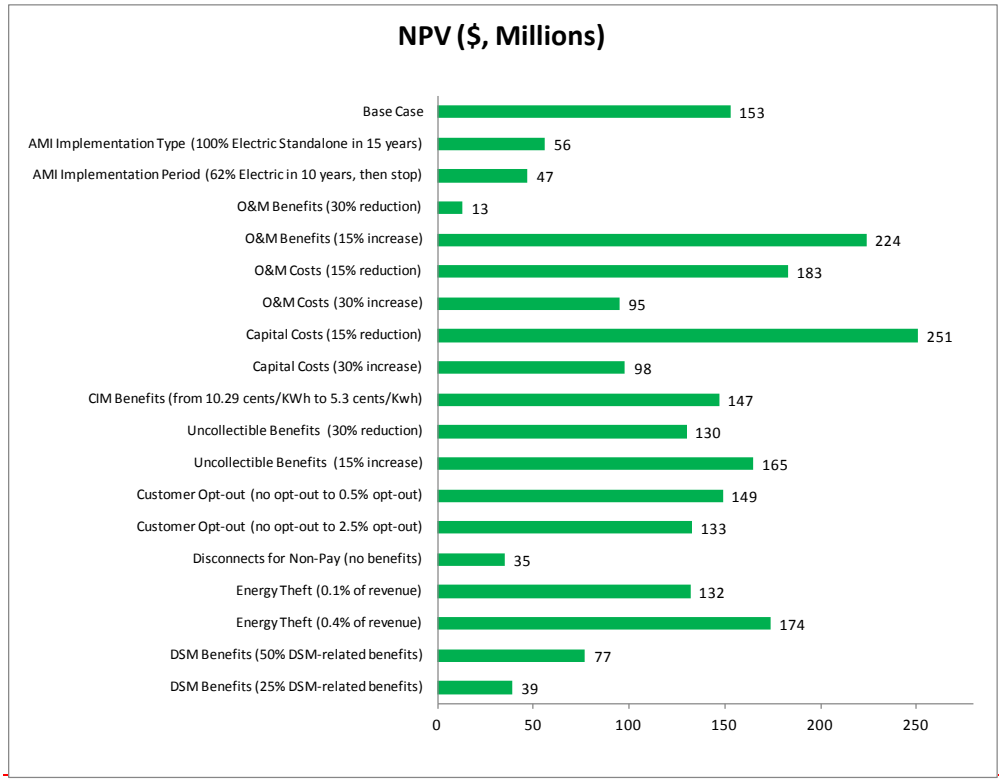
Sensitivity Variable	Base Case Value	Sensitivity Range / Assumptions	Description / Rationale	New NPV
Energy Theft Reduction	0.25%	0.1% - 0.4%	The model estimates that AMI will help Ameren Illinois save 0.25% of revenue associated with each AMI meter that is currently lost due to energy theft. Ameren Illinois has observed that other utilities have seen energy theft reduction benefits in the range of 0.5% - 1% of revenue. For the purposes of the sensitivity analysis, Ameren Illinois estimates (again, conservatively) that between 0.1% and 0.4% of revenue associated with each AMI meter can be saved as a result of AMI.	~~$132 million - $174~~[$390 - $422] million
~~DSM Benefits~~Customer/ Societal (DR,EE,& PEV)	~~$171 million~~40% participation rate	~~25% - 50% of projected DSM benefits~~20% - 60% participation rates	Ameren Illinois has conducted ~~sensitivity~~analysis around ~~DSM~~Customer/Societal benefits and assumed 40% participation rate by ~~assuming that it will only be able to realize 50% of the DSM benefits projected~~customers in the base case. For the purposes of the ~~cost / benefit analysis. Positive NPV is still achieved with 25% DSM benefit.~~sensitivity analysis, Ameren Illinois has taken 50% to 150% of this value.	~~$39 million - $77~~[$200 - $612] million

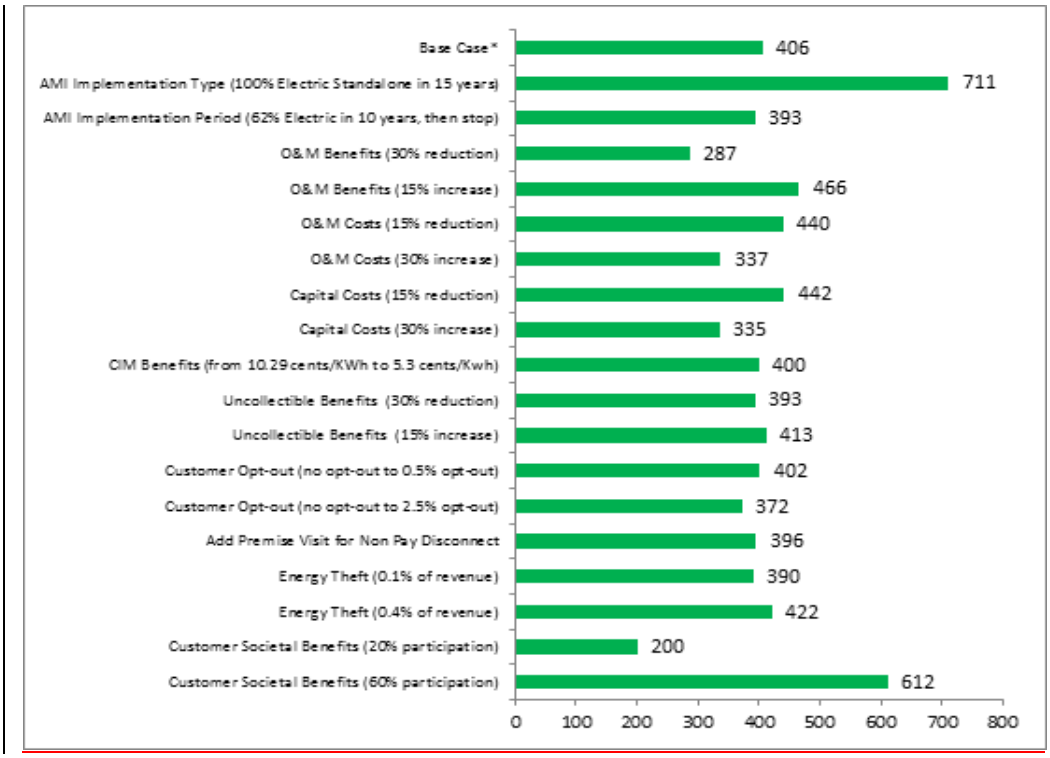
~~6.2.~~7.2. Sensitivity Analysis Results

Figure ~~6~~5 shown below graphically illustrates how Ameren Illinois' AMI NPV changes with respect to changes in the cost and benefit assumptions for the major drivers of the AMI business case.

It can be noted that ~~barring an overall O&M benefit reduction or capital cost increase of 40%,~~ the business case NPV remains positive despite conservative assumptions around certain cost and benefit drivers.

Figure ~~6~~5: Sensitivity Analysis Results – Revised NPVs ($ millions)




Base Case*
406
AMI Implementation Type (100% Electric Standalone in 15 years)
711
AMI Implementation Period (62% Electric in 10 years, then stop)
393
O&M Benefits (30% reduction)
287
O&M Benefits (15% increase)
466
O&M Costs (15% reduction)
440
O&M Costs (30% increase)
337
Capital Costs (15% reduction)
442
Capital Costs (30% increase)
335
CIM Benefits (from 10.29 cents/KWh to 5.3 cents/Kwh)
400
Uncollectible Benefits (30% reduction)
393
Uncollectible Benefits (15% increase)
413
Customer Opt-out (no opt-out to 0.5% opt-out)
402
Customer Opt-out (no opt-out to 2.5% opt-out)
372
Add Premise Visit for Non Pay Disconnect
396
Energy Theft (0.1% of revenue)
390
Energy Theft (0.4% of revenue)
422
Customer Societal Benefits (20% participation)
200
Customer Societal Benefits (60% participation)
612
0
100
200
300
400
500
600
700
800

~~7.~~8. Appendix

~~7.1.~~8.1. General Assumptions

- The business case assumes ~~100~~62% deployment of AMI electric ~~and associated gas~~ meters over a period of ~~15~~8 years
- The model analysis period is 20 years ~~from 2012 through 2031~~ending in 2032, with AMI meter deployment commencing in year ~~2013~~2014
- Meter depreciation time (useful life) period used in the model is 20 years
- Meter growth rate is estimated at 0.25% annually
- Salvage cost per meter is assumed to be $1.00
- The following escalation rates over the 20-year business case time horizon are assumed:
  - General: 2.5%
  - Labor: 3.0%
  - Transportation: 4.75%
  - Meters: 0.0%
- Financial Assumptions
  - AIC composite tax rate of 41.2% is used to calculate Net Customer Impact
  - Discount Rate of 3.62% (20-year Treasury Rate) is used to calculate NPV
- ~~80% IT costs are allocated to electric meter deployment while the remaining 20% are allocated to gas meter deployment~~
- ~~60% of AMI network costs are allocated to electric meter deployment and 40% are allocated to gas deployment~~
- Assumes full implementation of AMI technologies to all electric customers
  - No customer opt-out is assumed for the cost / benefit analysis
  - No ~~personal on-site notification~~premise visit is required for disconnects for non-pay

~~7.2.~~8.2. Cost Summary by Year

(in $ millions)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capital Items - Summary																				
Meters																				
AMI Meters	-	0.8	7.9	9.9	10.2	10.2	10.3	10.3	10.4	10.4	10.1	10.1	10.2	10.2	10.3	0.3	0.3	0.3	0.3	0.3
AMI Meter Installation	-	0.1	1.4	1.7	1.9	1.9	2.0	2.1	2.2	2.3	2.3	2.4	2.4	2.5	2.6	0.2	0.2	0.3	0.3	0.3
AMI Communications Network Hardware & Installation	-	2.0	3.2	1.8	1.8	1.8	1.9	1.9	1.8	1.9	1.8	7.0	1.8	1.9	1.9	0.1	0.1	0.1	0.1	0.1
Information Technology (Applications and Operations)																				
Hardware	-	2.1	0.1	0.7	0.2	0.2	1.2	0.6	2.1	0.3	0.3	1.1	0.3	3.5	0.2	0.2	1.0	0.1	4.2	0.0
Software	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Labor	0.1	24.0	21.7	10.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Security and Planning	0.0	0.4	0.4	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project Management	1.0	5.8	5.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operations	0.2	1.2	1.1	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Program Management																				
Program Management	0.6	3.1	3.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AMI Operations																				
Metering Operations	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1	0.0	0.0	0.0	0.0	0.0
Communications	0.4	0.8	1.1	0.9	0.7	0.5	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Total Capital	3.1	41.7	45.7	27.4	15.6	15.6	16.4	15.9	17.6	15.9	15.5	21.8	15.9	19.4	16.3	1.0	1.8	0.9	5.0	0.8
O&M Items - Summary																				
Meter Reading Costs																				
AMI Meters	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AMI Communications Network	-	0.0	0.2	0.3	0.6	0.8	1.0	1.3	1.6	1.9	2.2	2.5	2.8	3.2	3.6	3.8	4.0	4.1	4.2	4.4
Opt Out Exchange Costs	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Accelerated Depreciation for Existing Meters	-	0.1	0.7	1.3	1.9	2.3	2.3	1.7	0.9	0.3	-0.2	-0.5	-0.8	-0.9	-0.9	-0.9	-0.9	-0.8	-0.7	-0.6
Information Technology (Applications and Operations)																				
Hardware		0.1	0.4	0.3	0.4	0.4	0.2	0.5	0.3	0.5	0.5	0.3	0.8	0.3	0.6	0.6	0.4	1.0	0.3	0.6
Software	-	1.1	1.9	2.2	2.3	2.5	2.7	2.8	3.0	3.2	3.3	3.5	3.6	3.8	4.0	3.8	3.9	3.9	4.0	4.0
Labor	0.1	0.0	0.5	5.2	2.8	2.7	2.8	2.9	3.0	3.0	3.1	3.2	3.2	3.3	3.4	3.5	3.5	3.6	3.7	3.7
Security and Planning	-	0.0	0.1	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Project Management	0.8	0.6	2.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operations	-	0.0	1.2	1.2	1.0	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.7	1.7	1.7	1.8
Management and Other Costs																				
Metering Operations	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.5	0.5	0.6	0.6	0.6
Communications	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Consumer Education	0.5	2.1	2.2	2.2	2.3	2.3	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	0.0	0.0	0.0	0.0	0.0
Total O&M	1.6	4.2	9.3	13.9	11.7	12.7	12.0	12.2	11.9	12.1	12.2	12.3	13.2	13.3	14.2	13.2	13.4	14.3	14.1	14.8
Grand Total O&M / Capital	4.7	45.9	55.0	41.3	27.2	28.3	28.4	28.2	29.4	28.0	27.7	34.1	29.2	32.7	30.6	14.2	15.2	15.2	19.1	15.7

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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capital Items - Summary																				
Meters																				
AMI Meters	$ -	$ 4,066,064	$ 14,935,866	$ 15,010,520	$ 15,085,454	$ 15,160,668	$ 15,236,165	$ 198,737	$ 199,234	$ 199,732	$ 200,231	$ 200,732	$ 201,234	$ 201,737	$ 202,241	$ 202,747	$ 203,253	$ 203,762	$ 204,271	$ 204,782
AMI Meter Installation	-	1,233,059	4,665,274	4,829,250	4,998,959	5,174,600	5,356,379	71,963	74,308	76,728	79,228	81,808	84,473	87,225	90,066	93,000	96,030	99,158	102,388	105,723
AMI Communications Network Hardware & Installation	-	1,825,250	3,461,525	3,528,003	3,595,942	3,620,824	3,618,427	29,294	29,672	30,056	30,447	30,845	31,250	31,662	32,082	32,509	32,944	33,386	33,837	34,296
Information Technology (Applications and Operations)																				
Hardware	1,881,557	42,171	87,986	154,627	211,376	249,902	2,706,755	204,087	133,802	87,986	-	-	3,051,933	-	-	-	-	-	3,010,283	-
Software	859,040	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Labor	24,154,257	22,247,223	22,834,895	3,644,156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Security and Planning	256,317	420,762	-	143,987	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Project Management	7,753,566	5,324,115	5,479,186	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operations	1,608,872	1,500,382	1,544,082	264,630	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asset Management	-	1,092,727	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Program Management																				
Program Management	5,206,300	4,165,040	3,123,780	780,945	780,945	780,945	780,945	-	-	-	-	-	-	-	-	-	-	-	-	-
AMI Operations																				
Metering Operations	1,027,346	1,058,166	1,089,911	1,122,608	1,156,287	1,190,975	1,226,704	-	-	-	-	-	-	-	-	-	-	-	-	-
Communications	690,420	888,916	1,355,064	1,357,994	1,313,256	1,352,653	1,393,233	-	-	-	-	-	-	-	-	-	-	-	-	-
Gas Module Replacements	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Capital	$ 43,437,673	$ 43,863,875	$ 58,577,570	$ 30,836,721	$ 27,142,217	$ 27,530,568	$ 30,318,609	$ 504,081	$ 437,015	$ 394,503	$ 309,906	$ 313,385	$ 3,368,890	$ 320,624	$ 324,389	$ 328,256	$ 332,227	$ 336,306	$ 3,350,779	$ 344,801
O&M Items - Summary																				
Meter Reading Costs																				
Manual Disconnect & Read to Meet Metrics	568,284	681,826	675,698	538,622	479,389	476,989	346,277	275,776	353,779	539,068	-	-	-	-	-	-	-	-	-	-
AMI Communications Network	-	94,551	322,718	597,250	889,332	1,199,817	1,529,594	1,728,798	1,784,050	1,841,074	1,899,929	1,960,673	2,023,367	2,088,074	2,154,859	2,223,789	2,294,932	2,368,360	2,444,147	2,522,369
Opt Out Exchange Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disconnect for Non-Pay Premise Visit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Accelerated Depreciation for Existing Meters	-	318,275	1,352,137	2,208,809	2,898,054	3,178,750	3,102,888	1,364,978	(62,099)	(1,205,892)	(2,118,401)	(2,755,967)	(2,306,681)	(1,893,790)	(1,517,830)	(1,164,791)	(867,577)	(606,757)	(381,573)	(190,829)
Information Technology (Applications and Operations)																				
Hardware	220,790	417,120	489,880	521,760	567,000	621,200	356,880	699,880	728,160	743,920	743,920	743,920	356,880	743,920	743,920	743,920	743,920	743,920	356,880	743,920
Software	5,760,936	2,006,130	2,496,365	2,615,037	2,697,788	2,905,653	3,026,450	2,541,332	2,569,066	2,597,597	2,626,948	2,657,145	2,688,211	2,720,173	2,753,058	2,786,894	2,821,709	2,857,531	2,894,392	2,948,338
Labor	-	701,610	1,666,323	4,221,859	3,459,533	3,552,199	3,644,865	3,737,531	3,830,197	3,922,863	4,015,529	4,108,195	4,197,367	4,293,527	4,386,193	4,478,859	4,571,525	4,664,191	4,756,857	4,849,523
Security and Planning	-	-	103,000	103,000	266,699	271,084	275,469	279,854	284,238	291,713	299,281	306,944	314,705	322,568	330,535	338,609	346,794	355,093	363,510	372,047
Project Management	1,654,740	1,704,382	877,012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operations	-	-	795,938	1,183,565	1,473,293	1,512,756	1,552,219	1,591,682	1,631,146	1,670,609	1,710,072	1,749,535	1,788,998	1,828,462	1,867,925	1,907,388	1,946,851	1,986,314	2,025,778	2,065,241
Asset Management	-	-	3,659	17,614	32,475	48,285	65,090	82,939	85,641	88,431	91,311	94,286	97,357	100,528	103,803	107,185	110,676	114,281	118,004	121,848
Management and Other Costs																				
Metering Operations	206,876	213,082	219,474	226,058	232,840	239,825	247,020	489,290	503,969	519,088	534,660	550,700	567,221	584,238	601,765	619,818	638,412	657,565	677,292	697,610
Customer Education - Deployment & Initial Functionality	525,313	1,704,108	1,992,178	2,052,058	2,113,737	1,582,924	1,633,504	4,970	5,107	5,248	5,393	5,541	5,694	5,851	6,012	6,178	6,348	6,523	6,703	6,888
Demand Response	-	-	-	92,411	137,215	238,008	369,938	423,614	338,171	301,167	228,466	151,670	91,388	51,724	28,251	15,193	8,178	4,476	5,053	491
Energy Efficiency	-	-	-	92,411	137,215	238,008	369,938	423,614	338,171	301,167	228,466	151,670	91,388	51,724	28,251	15,193	8,178	4,476	5,053	491
Electric Vehicle Enhancement	-	-	-	482,679	706,842	1,207,981	1,847,644	2,079,014	1,783,097	1,586,243	1,201,454	795,689	477,570	268,519	144,998	76,448	39,754	20,512	23,755	-
Customer Technology Interface & Support	-	-	-	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	200,000	200,000	200,000	200,000	200,000	200,000
Customer Education - Dynamic Pricing & Technology	-	-	551,906	565,704	579,847	594,343	609,201	624,431	640,042	656,043	672,444	689,256	706,487	724,149	742,253	760,809	779,829	799,325	819,308	839,791
Total O&M	$ 8,936,938	$ 7,841,084	$ 11,546,289	$ 17,518,838	$ 18,671,258	$ 19,867,822	$ 20,976,978	$ 18,347,704	$ 16,812,735	$ 15,858,338	$ 14,139,474	$ 13,209,258	$ 13,099,953	$ 13,889,667	$ 12,573,993	$ 13,115,492	$ 13,649,530	$ 14,175,813	$ 14,315,159	$ 15,177,730
Grand Total O&M / Capital	52,374,611	51,704,958	70,123,859	48,355,558	45,813,476	47,398,390	51,295,587	18,851,785	17,249,750	16,252,841	14,449,380	13,522,643	16,468,844	14,210,291	12,898,382	13,443,748	13,981,757	14,512,118	17,665,937	15,522,531

~~7.3.~~8.3. Benefits Summary by Year

(in $ millions)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
O&M Items - Summary																				
Meter Reading																				
Reduction in Manual Meter Reading Expenses	-	-	-	1.8	3.2	4.7	6.3	7.9	9.4	9.7	10.0	10.3	10.6	11.0	11.3	11.7	12.1	12.5	12.9	13.3
Reduction in AMR Meter Reading Expenses	-	-	-	0.0	0.0	0.0	0.0	0.0	0.8	2.4	4.0	5.6	7.4	9.2	11.1	12.3	12.6	13.0	13.3	13.7
Reduction in Manual and AMR Meter IT Costs	-	-	-	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Reduction in On-Cycle Meter Reading Vehicle	-	-	-	0.1	0.2	0.2	0.3	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8
Field & Meter Services	-	-	-																	
Reduction in Manual Disconnect / Reconnect Meters	-	-	-	0.5	1.3	2.1	3.0	3.8	4.8	5.8	6.9	7.9	9.1	10.3	11.6	13.0	13.4	13.8	14.3	14.8
Reduction in Manual Off-Cycle / Special Meter Reads	-	-	-	0.7	1.2	1.7	2.3	2.9	3.3	3.4	3.5	3.6	3.8	3.9	4.0	4.1	4.3	4.4	4.5	4.7
Reduction in Nuisance Stopped Meter Orders	-	-	-	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6
Reduction in Field Services Vehicle Expense	-	-	-	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.3	1.4	1.5	1.6	1.7	1.8
Reduction in Customer Equipment Problem Outage Field Trips	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction in "OK on Arrival" Outage Field Trips	-	-	-	0.0	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	1.0	1.1	1.2	1.2	1.3	1.3	1.4
Salvage Value of Replaced Meters	-	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Reduction in Unacounted for Energy	-	-	-																	
Theft / Tamper Detection & Reduction	-	-	-	0.1	0.5	0.7	1.0	1.3	1.6	1.9	2.2	2.5	2.9	3.2	3.5	3.9	3.9	4.0	4.1	4.1
Faster Identification of Dead Meters	-	-	-	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.6	0.6
Billing Fuction	-	-	-																	
Reduction in Bill Inquiry Calls	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Reduction in Float Between Meter Read & Customer Billing	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Information Technology (Applications and Operations)																				
Information Technology	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3
Miscellaneous																				
Distribution System Management	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total O&M Impacts	0.0	0.0	0.2	3.5	7.1	10.5	14.2	18.1	22.4	25.9	29.7	33.5	37.6	41.9	46.3	50.1	51.6	53.2	54.8	56.5
Capital Items - Summary																				
Distribution System Management	-	-	-	-	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.3	1.3	1.4	1.4	1.4
Avoided Meter Purchases	-	0.0	0.2	0.3	0.5	0.6	0.8	1.0	0.9	0.9	0.8	0.8	0.7	0.7	0.6	0.5	0.6	0.6	0.6	0.6
Total Capital Impacts	-	0.0	0.2	0.3	0.7	0.9	1.2	1.4	1.5	1.5	1.6	1.7	1.7	1.8	1.9	1.8	1.9	2.0	2.0	2.1
Customer Benefits																				
Consumption on Inactive Meters	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.7	0.9	1.2	1.4	1.7	1.7	1.8	1.8	1.9
Uncollectible Expense	-	-	-	0.3	0.9	1.5	2.1	2.7	3.3	4.0	4.7	5.4	6.1	6.9	7.7	8.5	8.7	9.0	9.2	9.4
Demand Benefits	-	-	-	-	0.1	0.3	0.8	1.6	2.8	4.1	5.6	7.4	9.5	12.0	14.8	18.0	20.1	22.3	24.6	27.0
Total Customer Impacts	-	-	-	0.3	1.0	1.8	2.9	4.3	6.2	8.2	10.8	13.5	16.6	20.0	23.9	28.2	30.5	33.0	35.6	38.3
Total Benefits	0.0	0.1	0.4	4.1	8.8	13.3	18.3	23.9	30.0	35.7	42.1	48.7	55.9	63.7	72.1	80.1	84.0	88.1	92.4	96.8

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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
O&M Items - Summary																				
Meter Reading																				
Reduction in Manual Meter Reading Expenses	$ -	$ -	$ 1,516,398	$ 3,589,502	$ 5,796,060	$ 7,718,730	$ 9,057,114	$ 9,352,149	$ 9,656,795	$ 9,971,365	$ 10,296,183	$ 10,631,581	$ 10,977,904	$ 11,335,510	$ 11,704,764	$ 12,086,047	$ 12,479,750	$ 12,886,277	$ 13,306,048	$ 13,739,492
Reduction in AMR Meter Reading Expenses	-	-	-	-	-	412,947	1,929,049	3,090,705	3,175,893	3,263,428	3,353,377	3,445,804	3,540,779	3,638,372	3,738,654	3,841,701	3,947,588	4,056,393	4,168,198	4,283,084
Reduction in Manual and AMR Meter IT Costs	-	-	8,436	40,408	74,136	109,692	133,640	137,324	141,109	144,998	148,995	153,101	157,321	161,657	166,113	170,692	175,396	180,231	185,198	190,303
Reduction in On-Cycle Meter Reading Vehicle	-	-	70,631	170,034	279,222	378,164	430,801	452,393	475,066	498,876	523,879	550,135	577,707	606,661	637,066	668,995	702,524	737,734	774,708	813,535
Field & Meter Services																				
Reduction in Manual Disconnect / Reconnect Meters	-	-	213,815	1,372,263	2,529,966	3,761,638	5,070,868	6,461,403	6,671,883	6,889,220	7,113,636	7,345,363	7,584,638	7,831,708	8,086,826	8,350,254	8,622,263	8,903,134	9,193,153	9,492,620
Reduction in Manual Off-Cycle / Special Meter Reads	-	-	560,489	1,326,748	2,142,333	2,852,988	3,195,806	3,299,909	3,407,403	3,518,400	3,633,011	3,751,357	3,873,557	3,999,738	4,130,030	4,264,566	4,403,484	4,546,927	4,695,043	4,847,984
Reduction in Nuisance Stopped Meter Orders	-	-	6,012	57,880	106,711	158,662	213,883	272,535	281,413	290,580	300,045	309,819	319,911	330,333	341,093	352,204	363,677	375,524	387,757	400,388
Reduction in Field Services Vehicle Expense	-	-	28,079	161,794	303,157	458,282	605,167	728,174	764,669	802,994	843,239	885,501	929,881	976,485	1,025,426	1,076,819	1,130,788	1,187,461	1,246,975	1,309,472
Reduction in Customer Equipment Problem Outage Field Trips	-	-	-	4,509	8,314	12,361	16,663	21,232	21,924	22,638	23,376	24,137	24,923	25,735	26,574	27,439	28,333	29,256	30,209	31,193
Reduction in "OK on Arrival" Outage Field Trips	-	-	-	126,892	233,944	347,835	468,899	597,480	616,943	637,040	657,792	679,219	701,345	724,191	747,782	772,141	797,293	823,265	850,083	877,774
Salvage Value of Replaced Meters	-	40,714	149,553	150,301	151,051	151,804	152,560	1,990	1,995	2,000	2,005	2,010	2,015	2,020	2,025	2,030	2,035	2,040	2,045	2,050
Reduction in Unacounted for Energy																				
Theft / Tamper Detection & Reduction	-	-	51,894	491,527	891,597	1,304,292	1,729,911	2,168,762	2,203,318	2,238,425	2,274,091	2,310,325	2,347,136	2,384,535	2,422,528	2,461,128	2,500,342	2,540,181	2,580,655	2,621,774
Faster Identification of Dead Meters	-	-	7,491	70,950	128,698	188,268	249,704	313,051	318,039	323,106	328,254	333,484	338,798	344,196	349,681	355,252	360,913	366,663	372,505	378,441
Billing Fuction																				
Reduction in Call Volume	-	-	31,785	152,955	281,915	419,043	561,735	708,468	731,393	755,062	779,497	804,723	830,767	857,654	885,413	914,071	943,657	974,202	1,005,736	1,038,292
Reduction in Float Between Meter Read & Customer Billing	-	-	1,253	5,934	10,764	15,746	20,885	26,183	26,600	27,024	27,454	27,892	28,336	28,788	29,246	29,712	30,186	30,667	31,155	31,652
Reduction in Call Center Back Office Management	-	-	3,659	17,614	32,475	48,285	65,090	82,939	85,641	88,431	91,311	94,286	97,357	100,528	103,803	107,185	110,676	114,281	118,004	121,848
Information Technology (Applications and Operations)																				
Information Technology	-	37,422	203,769	210,668	217,813	225,214	232,880	240,821	283,699	262,147	271,209	280,602	290,340	300,437	310,905	321,760	333,018	344,693	401,682	366,487
Miscellaneous																				
Distribution System Management	-	-	-	12,855	23,586	34,898	46,815	59,363	61,000	62,681	64,409	66,184	68,008	69,882	71,809	73,788	75,822	77,911	80,059	82,266
Outage Management	-	-	-	171,970	317,052	471,403	635,474	809,733	836,110	863,347	891,470	920,510	950,496	981,458	1,013,429	1,046,441	1,080,529	1,115,727	1,152,072	1,189,601
Asset Management	-	-	13,946	67,128	123,760	184,010	248,055	316,076	326,373	337,004	347,982	359,318	371,022	383,108	395,588	408,474	421,780	435,520	449,707	464,356
Total O&M Impacts	$ -	$ 78,136	$ 2,867,210	$ 8,201,933	$13,652,553	$19,254,261	$25,065,000	$ 29,140,691	$ 30,087,266	$ 30,998,764	$ 31,971,214	$ 32,975,351	$ 34,012,244	$ 35,082,997	$ 36,188,754	$ 37,330,698	$ 38,510,054	$ 39,728,089	$ 41,030,994	$ 42,282,614
Capital Items - Summary																				
Distribution System Management	-	-	-	259,477	383,927	515,039	653,088	671,089	689,586	708,592	728,123	748,192	768,814	790,004	811,779	834,153	857,145	880,770	905,046	929,991
Outage Management	-	-	-	206,439	380,600	565,889	762,845	972,033	1,003,697	1,036,392	1,070,153	1,105,013	1,141,009	1,178,177	1,216,556	1,256,186	1,297,106	1,339,359	1,382,989	1,428,040
Asset Management	-	-	20,369	98,047	180,765	268,767	362,311	461,664	476,702	492,231	508,265	524,822	541,918	559,571	577,799	596,621	616,056	636,124	656,846	678,243
Avoided Meter Purchases	-	84,375	372,654	597,426	831,752	945,957	860,616	773,559	792,399	811,837	831,892	852,584	873,935	895,965	918,696	942,152	966,356	991,332	1,017,105	1,043,701
Total Capital Impacts	$ -	$ 84,375	$ 393,024	$ 1,161,390	$ 1,777,043	$ 2,295,652	$ 2,638,860	$ 2,878,344	$ 2,962,384	$ 3,049,052	$ 3,138,433	$ 3,230,611	$ 3,325,676	$ 3,423,717	$ 3,524,831	$ 3,629,112	$ 3,736,662	$ 3,847,584	$ 3,961,985	$ 4,079,975
Customer Benefits																				
Consumption on Inactive Meters	365,973	450,213	538,437	630,791	727,426	828,498	934,169	1,044,606	1,159,981	1,280,472	756,194	777,037	798,454	820,461	843,075	866,312	890,190	914,726	939,938	965,845
Uncollectible Expense	-	-	140,634	1,001,051	1,608,576	2,248,830	2,923,156	3,317,942	3,409,393	3,656,593	3,599,926	3,699,149	3,801,107	3,905,875	4,013,531	4,124,153	4,237,825	4,354,631	4,474,655	4,597,988
Demand Response	-	-	-	244,502	854,987	2,385,513	5,701,934	11,036,302	15,690,540	20,489,697	24,802,353	28,319,728	31,067,343	33,231,018	35,011,404	36,564,771	37,996,735	39,373,859	40,837,689	42,167,714
Energy Efficiency	-	-	-	25,665	73,632	187,669	399,794	690,786	988,023	1,317,516	1,616,042	1,828,815	1,940,223	2,014,902	2,061,021	2,089,771	2,108,360	2,121,140	2,135,921	2,141,248
Electric Vehicle Enhancement	-	-	-	189,047	532,663	1,244,966	2,583,462	4,445,113	6,248,437	8,047,096	9,606,174	10,835,029	11,764,385	12,436,569	12,940,110	13,337,049	13,668,613	13,960,307	14,288,056	14,549,000
Carbon Reduction	-	-	-	-	-	-	-	-	-	-	-	-	963,990	1,115,512	1,257,885	1,393,714	1,524,932	1,653,902	1,713,977	1,768,298
Value of Reduced Outage Duration	-	-	-	348,415	639,236	945,824	1,268,827	1,608,916	1,653,262	1,698,830	1,745,654	1,793,769	1,843,209	1,894,013	1,946,217	1,999,859	2,054,980	2,111,621	2,169,822	2,229,628
Total Customer Impacts	$ 365,973	$ 450,213	$ 679,071	$ 2,439,471	$ 4,436,519	$ 7,841,300	$13,811,342	$ 22,143,667	$ 29,149,637	$ 36,490,205	$ 42,126,343	$ 47,253,527	$ 52,178,711	$ 55,418,348	$ 58,073,242	$ 60,375,630	$ 62,481,637	$ 64,490,185	$ 66,560,058	$ 68,419,721
	$ 365,973	$ 612,724	$ 3,939,305	$11,802,793	$19,866,116	$29,391,213	$41,515,201	$ 54,162,702	$ 62,199,287	$ 70,538,021	$ 77,235,990	$ 83,459,489	$ 89,516,630	$ 93,925,063	$ 97,786,827	$ 101,335,440	$ 104,728,353	$ 108,065,858	$ 111,553,038	$ 114,782,310

~~7.4.~~8.4. Net Customer Impacts Summary by Year

(in $ millions)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
O&M Benefits																				
Total AMI O&M Savings	0.0	0.0	0.2	3.5	7.1	10.5	14.2	18.1	22.4	25.9	29.7	33.5	37.6	41.9	46.3	50.1	51.6	53.2	54.8	56.5
O&M Expenses																				
Meters and Modules	-	(0.1)	(0.8)	(1.7)	(2.4)	(3.1)	(3.3)	(3.0)	(2.5)	(2.2)	(2.0)	(2.0)	(2.1)	(2.3)	(2.7)	(2.9)	(3.1)	(3.3)	(3.5)	(3.8)
Information Technology Applications and Operations	(0.9)	(1.8)	(6.1)	(9.9)	(6.8)	(7.2)	(7.3)	(7.8)	(7.9)	(8.4)	(8.6)	(8.7)	(9.5)	(9.3)	(9.8)	(9.8)	(9.8)	(10.5)	(10.0)	(10.5)
Management and Other Costs	(0.6)	(2.2)	(2.3)	(2.4)	(2.4)	(2.5)	(1.4)	(1.4)	(1.5)	(1.5)	(1.5)	(1.6)	(1.6)	(1.7)	(1.7)	(0.5)	(0.5)	(0.6)	(0.6)	(0.6)
Total AMI O&M Expense	(1.6)	(4.2)	(9.3)	(13.9)	(11.7)	(12.7)	(12.0)	(12.2)	(11.9)	(12.1)	(12.2)	(12.3)	(13.2)	(13.3)	(14.2)	(13.2)	(13.4)	(14.3)	(14.1)	(14.8)
Depreciation / Taxes and Total Costs to Customers																				
Net Change in Operation and Maintenance Expense	(1.5)	(4.1)	(9.0)	(10.4)	(4.6)	(2.2)	2.2	5.9	10.5	13.9	17.5	21.3	24.4	28.6	32.1	36.8	38.2	38.8	40.8	41.7
Net Change in Book Depreciation	(0.2)	(4.2)	(11.5)	(16.6)	(18.6)	(19.2)	(16.4)	(10.6)	(7.2)	(7.0)	(7.8)	(8.6)	(9.6)	(10.5)	(11.4)	(11.8)	(11.5)	(11.2)	(11.1)	(11.1)
Net Change in Income Taxes	(0.1)	(1.4)	(2.5)	(2.7)	(2.4)	(2.2)	(2.2)	(2.4)	(2.6)	(2.8)	(2.9)	(3.2)	(3.2)	(3.4)	(3.4)	(2.9)	(2.4)	(2.0)	(1.7)	(1.3)
Net Change in Return Requirement	(0.2)	(3.2)	(5.7)	(6.0)	(5.4)	(5.0)	(5.0)	(5.3)	(5.8)	(6.2)	(6.4)	(7.1)	(7.2)	(7.6)	(7.6)	(6.4)	(5.4)	(4.5)	(3.9)	(3.0)
Total Cost to Customers	(2.1)	(13.0)	(28.8)	(35.8)	(31.0)	(28.7)	(21.4)	(12.3)	(5.1)	(2.0)	0.4	2.3	4.3	7.2	9.7	15.8	18.8	21.1	24.1	26.2
Customer Benefits																				
Consumption on Inactive Meters	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.7	0.9	1.2	1.4	1.7	1.7	1.8	1.8	1.9
Uncollectible Expense	-	-	-	0.3	0.9	1.5	2.1	2.7	3.3	4.0	4.7	5.4	6.1	6.9	7.7	8.5	8.7	9.0	9.2	9.4
Demand / Energy Benefits	-	-	-	-	0.1	0.3	0.8	1.6	2.8	4.1	5.6	7.4	9.5	12.0	14.8	18.0	20.1	22.3	24.6	27.0
Terminal Value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	155.9
Total Customer Benefits	-	-	-	0.3	1.0	1.8	2.9	4.3	6.2	8.2	10.8	13.5	16.6	20.0	23.9	28.2	30.5	33.0	35.6	194.2
Net Customer Impact (Change in Customer Costs)	(2.1)	(13.0)	(28.8)	(35.5)	(30.0)	(26.8)	(18.5)	(8.0)	1.0	6.2	11.2	15.8	20.9	27.2	33.6	44.0	49.3	54.1	59.6	220.4
Cumulative Net Customer Impact	(2.1)	(15.1)	(43.9)	(79.3)	(109.3)	(136.1)	(154.6)	(162.6)	(161.6)	(155.4)	(144.2)	(128.3)	(107.5)	(80.3)	(46.7)	(2.7)	46.6	100.8	160.4	380.8
Net Present Value of Net Customer Impact	153.4																			

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	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
O&M Benefits																				
Total AMI O&M Savings	$ -	$ 78,136	$ 2,867,210	$ 8,201,933	$ 13,652,553	$ 19,254,261	$ 25,065,000	$ 29,140,691	$ 30,087,266	$ 30,998,764	##########	$ 32,975,351	$ 34,012,244	$ 35,082,997	$ 36,188,754	$ 37,330,698	$ 38,510,054	$ 39,728,089	$ 41,030,994	$ 42,282,614
O&M Expenses																				
Meters and Modules	(568,284)	(1,094,653)	(2,350,553)	(3,344,681)	(4,266,775)	(4,855,556)	(4,978,759)	(3,369,553)	(2,075,729)	(1,174,250)	218,472	795,293	283,314	(194,284)	(637,029)	(1,058,998)	(1,427,355)	(1,761,603)	(2,062,574)	(2,331,540)
Information Technology Applications and Operations	(7,636,466)	(4,829,242)	(6,432,177)	(8,662,836)	(8,496,788)	(8,911,177)	(8,920,973)	(8,933,217)	(9,128,448)	(9,315,133)	(9,487,061)	(9,660,024)	(9,443,519)	(10,009,178)	(10,185,434)	(10,362,855)	(10,541,475)	(10,721,332)	(10,515,421)	(11,100,918)
Management and Other Costs	(732,188)	(1,917,190)	(2,763,559)	(5,511,321)	(5,907,695)	(6,101,089)	(7,077,246)	(6,044,933)	(5,608,558)	(5,368,955)	(4,870,885)	(4,344,527)	(3,939,749)	(3,686,205)	(1,751,530)	(1,693,639)	(1,680,700)	(1,692,878)	(1,737,164)	(1,745,272)
Total AMI O&M Expense	(8,936,938)	(7,841,084)	(11,546,289)	(17,518,838)	(18,671,258)	(19,867,822)	(20,976,978)	(18,347,704)	(16,812,735)	(15,858,338)	(14,139,474)	(13,209,258)	(13,099,953)	(13,889,667)	(12,573,993)	(13,115,492)	(13,649,530)	(14,175,813)	(14,315,159)	(15,177,730)
Depreciation / Taxes and Total Costs to Customers																				
Net Change in Operation and Maintenance Expense	(8,936,938)	(7,762,948)	(8,679,079)	(9,316,905)	(5,018,705)	(613,560)	4,088,021	10,792,987	13,274,531	15,140,426	17,831,739	19,766,093	20,912,290	21,193,330	23,614,761	24,215,206	24,860,523	25,552,276	26,715,835	27,104,884
Net Change in Book Depreciation	(4,130,574)	(11,980,097)	(19,762,818)	(25,077,992)	(27,178,691)	(24,899,016)	(19,268,370)	(13,315,943)	(9,221,179)	(8,331,502)	(7,675,608)	(7,118,832)	(6,964,758)	(7,018,911)	(6,899,256)	(6,722,897)	(6,270,933)	(5,848,970)	(5,633,802)	(5,449,283)
Net Change in Income Taxes	(1,398,025)	(2,429,835)	(3,600,023)	(3,538,546)	(3,384,904)	(3,400,129)	(3,682,857)	(3,017,922)	(2,507,060)	(2,069,032)	(1,671,429)	(1,298,682)	(1,048,449)	(697,738)	(374,150)	(76,775)	191,760	439,925	581,357	836,164
Net Change in Return Requirement	(3,138,182)	(5,454,310)	(8,081,061)	(7,943,062)	(7,598,178)	(7,632,355)	(8,267,001)	(6,774,405)	(5,627,660)	(4,644,408)	(3,751,899)	(2,915,184)	(2,353,480)	(1,566,231)	(839,864)	(172,339)	430,448	987,511	1,304,986	1,876,959
Total Cost to Customers	(17,603,719)	(27,627,190)	(40,122,980)	(45,876,505)	(43,180,477)	(36,545,060)	(27,130,207)	(12,315,282)	(4,081,368)	95,485	4,732,803	8,433,395	10,545,604	11,910,450	15,501,492	17,243,196	19,211,798	21,130,743	22,968,375	24,368,725
Customer Benefits																				
Consumption on Inactive Meters	365,973	450,213	538,437	630,791	727,426	828,498	934,169	1,044,606	1,159,981	1,280,472	756,194	777,037	798,454	820,461	843,075	866,312	890,190	914,726	939,938	965,845
Uncollectible Expense	-	-	140,634	1,001,051	1,608,576	2,248,830	2,923,156	3,317,942	3,409,393	3,656,593	3,599,926	3,699,149	3,801,107	3,905,875	4,013,531	4,124,153	4,237,825	4,354,631	4,474,655	4,597,988
Demand Response	-	-	-	244,502	854,987	2,385,513	5,701,934	11,036,302	15,690,540	20,489,697	24,802,353	28,319,728	31,067,343	33,231,018	35,011,404	36,564,771	37,996,735	39,373,859	40,837,689	42,167,714
Energy Efficiency	-	-	-	25,665	73,632	187,669	399,794	690,786	988,023	1,317,516	1,616,042	1,828,815	1,940,223	2,014,902	2,061,021	2,089,771	2,108,360	2,121,140	2,135,921	2,141,248
Electric Vehicle Enhancement	-	-	-	189,047	532,663	1,244,966	2,583,462	4,445,113	6,248,437	8,047,096	9,606,174	10,835,029	11,764,385	12,436,569	12,940,110	13,337,049	13,668,613	13,960,307	14,288,056	14,549,000
Carbon Reduction	-	-	-	-	-	-	-	-	-	-	-	-	963,990	1,115,512	1,257,885	1,393,714	1,524,932	1,653,902	1,713,977	1,768,298
Customer Outage Benefits	-	-	-	348,415	639,236	945,824	1,268,827	1,608,916	1,653,262	1,698,830	1,745,654	1,793,769	1,843,209	1,894,013	1,946,217	1,999,859	2,054,980	2,111,621	2,169,822	2,229,628
Terminal Value	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	242,961,816
Total Customer Benefits	365,973	450,213	679,071	2,439,471	4,436,519	7,841,300	13,811,342	22,143,667	29,149,637	36,490,205	42,126,343	47,253,527	52,178,711	55,418,348	58,073,242	60,375,630	62,481,637	64,490,185	66,560,058	311,381,538
Net Customer Impact (Change in Customer Costs)	$ (17,237,746)	$ (27,176,976)	$ (39,443,909)	$ (43,437,035)	$ (38,743,958)	$ (28,703,761)	$ (13,318,866)	$ 9,828,385	$ 25,068,269	$ 36,585,689	##########	$ 55,686,922	$ 62,724,314	$ 67,328,799	$ 73,574,734	$ 77,618,826	$ 81,693,436	$ 85,620,927	$ 89,528,433	$ 335,750,262
Cumulative Net Customer Impact	(17,237,746)	(44,414,722)	(83,858,631)	(127,295,665)	(166,039,624)	(194,743,384)	(208,062,250)	(198,233,865)	(173,165,597)	(136,579,907)	(89,720,761)	(34,033,839)	28,690,475	96,019,274	169,594,008	247,212,833	328,906,269	414,527,196	504,055,630	839,805,892
Net Present Value of Net Customer Impact	$ 405,918,613																			

~~7.5.~~8.5. Total Resource Costs (TRC) Analysis by Year

(in $ millions)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total Customer Benefits (non-discounted)	0.0	0.0	0.2	3.8	8.1	12.4	17.1	22.4	28.5	34.2	40.5	47.0	54.2	61.9	70.2	78.3	82.1	86.2	90.4	250.7
Total Customer Benefits (discounted)	0.0	0.0	0.2	3.3	6.8	10.0	13.3	16.9	20.7	23.9	27.4	30.7	34.1	37.6	41.2	44.3	44.9	45.4	46.0	123.1
NPV of Customer Benefits	570																			
Total Customer Costs (non-discounted)	(2.1)	(13.0)	(29.0)	(39.2)	(38.1)	(39.2)	(35.6)	(30.4)	(27.5)	(28.0)	(29.3)	(31.2)	(33.3)	(34.7)	(36.7)	(34.3)	(32.8)	(32.0)	(30.8)	(30.2)
Total Customer Costs (discounted)	(2.1)	(12.1)	(26.1)	(34.0)	(31.9)	(31.7)	(27.8)	(22.9)	(20.0)	(19.6)	(19.8)	(20.4)	(21.0)	(21.1)	(21.5)	(19.4)	(17.9)	(16.9)	(15.7)	(14.8)
NPV of Customer Costs	(417)																			
Total Resource Costs	**1.37**																			

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Customer Benefits (non-discounted)	365,973	528,349	3,546,281	10,641,403	18,089,073	27,095,561	38,876,341	51,284,358	59,236,903	67,488,969	74,097,557	80,228,878	86,190,954	90,501,346	94,261,996	97,706,328	101,183,451	104,658,198	108,172,409	354,500,316
Total Customer Benefits (discounted)	353,187	492,078	3,187,443	9,230,486	15,142,527	21,889,539	30,309,605	38,586,574	43,013,032	47,293,005	50,110,002	52,360,967	54,286,900	55,010,400	55,294,612	55,312,754	55,280,058	55,180,886	55,041,255	174,078,392
NPV of Customer Benefits	871,453,705																			
Total Customer Costs (non-discounted)	(17,603,719)	(27,705,325)	(42,990,190)	(54,078,438)	(56,833,031)	(55,799,322)	(52,195,207)	(41,455,973)	(34,168,635)	(30,903,280)	(27,238,410)	(24,541,956)	(23,466,640)	(23,172,547)	(20,687,262)	(20,087,503)	(19,490,015)	(19,037,271)	(18,643,976)	(18,750,054)
Total Customer Costs (discounted)	(16,988,727)	(25,803,349)	(38,640,132)	(46,908,310)	(47,575,447)	(45,078,286)	(40,693,543)	(31,191,655)	(24,810,489)	(21,655,524)	(18,420,537)	(16,017,182)	(14,780,335)	(14,085,217)	(12,135,263)	(11,371,782)	(10,648,077)	(10,037,374)	(9,486,595)	(9,207,267)
NPV of Customer Costs	(465,535,092)																			
Total Resource Costs	1.87																			

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~~7.6.~~8.6. Terminal Value Summary

(in $ millions)

	5 Year Average 2027 - 2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
Total AMI O&M Annual Expense	(14.0)	(14.3)	(14.7)	(15.0)	(15.4)	(15.8)	(16.2)	(16.6)	(17.0)	(17.4)	(17.9)	(18.3)	(18.8)	(19.3)	(19.7)	(20.2)
Total Net Customer Impact (Change in Customer Costs)	54.3															
Total Net Customer Impact Without O&M Annual Expense	68.3															
Number of Meters Installed	1,309,790	1,308,536	1,230,295	1,132,059	1,031,367	930,172	828,474	726,269	623,557	520,334	420,525	320,223	219,424	118,128	16,332	13,082
Average Per Meter Net Customer Impact Without O&M Annual Expense	52.14	50.40	48.66	46.92	45.18	43.45	41.71	39.97	38.23	36.49	34.76	33.02	31.28	29.54	27.81	26.07
(assumes benefit declines 100% to 50% on straight-line basis)																
Calculated Net Customer Impact (Change in Customer Costs)		51.6	45.2	38.1	31.2	24.6	18.4	12.4	6.8	1.5	(3.3)	(7.8)	(11.9)	(15.8)	(19.3)	(19.9)
PV of Terminal Value in 2031	156															
NPV of Terminal Value in 2012	77															

	5 Year Average 2028 - 2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Number of Meters Installed	818,154	822,245	781,532	631,978	481,677	330,626	178,821	26,261	24,271	22,276	20,276	20,276	16,261	14,246	12,226	10,201
AMI System Still at Scale?		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No
(designates whether there are at least 100,000 meters installed)																
Total AMI O&M Annual Expense	(14,086,745)	(14,438,913)	(14,799,886)	(15,169,883)	(15,549,130)	(15,937,859)	(16,336,305)	-	-	-	-	-	-	-	-	-
Total Net Customer Impact (Change in Customer Costs)	85,450,013															
Total Net Customer Impact Without O&M Annual Expense	99,536,758															
Average Per Meter Net Customer Impact Without O&M Annual Expense	121.66	117.60	113.55	109.49	105.44	101.38	97.33	-	-	-	-	-	-	-	-	-
(assumes benefit declines 100% to 50% on straight-line basis)																
Calculated Net Customer Impact (Change in Customer Costs)		82,261,046	73,942,578	54,027,987	35,238,309	17,582,123	1,068,045	-	-	-	-	-	-	-	-	-
PV of Terminal Value in 2032	242,961,816															
NPV of Terminal Value in 2013	119,307,094															

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